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CHINA REPORT

AGRICULTURE

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VILLAGE ENTERPRISES SURPASS AGRICULTURE IN OUTPUT

OW141001 Beijing XINHUA Domestic Service in Chinese 0317 GMT 13 Nov 86

[Text] Beijing, 13 November (XINHUA)--(Reporters Shao Yongli and Zhou Yichang) At the current national conference on agricultural work, called by the Ministry of Agriculture, Animal Husbandry and Fishery, it was disclosed that this year the total output of China's village and town enterprises will surpass that of China's agriculture for the first time.

The value of the total output of China's village and town enterprises is expected to be over 330 billion yuan this year, an increase of 31 percent over last year, and will surpass that of agriculture for the first time.

Total employment in China's village and town enterprises has reached 76 million people, 20 percent of the nation's rural labor force, this is an increase of over 6 million over last year.

Thanks to the rural economic reform of recent years, village and town enterprises have sprung up everywhere, like mushrooms. Their numbers have shot up from over 1.42 million in 1980 to 12.2 million today. Their total output value accounts for 44 percent of the total social output value of rural areas. Village and town enterprises' total annual industrial output today is equal to the nation's total industrial output value for 1969. Since the beginning of this year, village and town etnerprises in various localities have overcome numerous difficulties and have maintained steady and fast growth. Many provinces and prefectures regard their developing village and town enterpriese as the key to revitalizing the rural economy and to readjusting the rural economic structure, and they have strengthened their leadership for this task. While vigorously developing village and town enterprises, these provinces and prefecture also stress quality, management, and the economic results of the village and town enterprises. They have readjusted village and town enterprises' professional structures, strengthened their lateral economic cooperation, and improved their technological levels. Many localities have even formulated specific plans to ensure health development in villages and town enterprises.

/12232
CSO: 4007/68

FARMLAND RECLAMATION SHOWS STEADY PROGRESS

OW221110 Beijing XINHUA Domestic Service in Chinese 1145 GMT 18 Nov 86

[By reporter Pu Liye]

[Excerpts] Beijing, 18 November (XINHUA)--[Words indistinct] The total industrial and agricultural output value of farmland reclamation departments this year is estimated at 18,546 million yuan. This is equivalent to 103.6 percent of the projected amount and shows a 10.8 percent rise compared with last year's figure. The output of grain and soybeans will be 7,879,000 metric tons, or 100.1 percent of the target and 12.8 percent more than last year.

During the past few years, farmland reclamation enterprises have promoted the operation of family farms by their staff members and workers as a measure to improve their work and carried out a host of major reforms, such as the implementation of the financial responsibility system, the combination of agriculture, industry, and commerce, and the system of contracted responsibility linking remuneration with output. This has put an end to the phenomenon of operating at a deficit that has persisted for 12 consecutive years in the farmland reclamation sector of our economy and brought about four changes as follows:

1. The family farms run by staff members and workers have increased in number--at the beginning they were only experminental farms in a few places; now they can be found everywhere. The operational system characterized by a big farm composed of many small farms has come into being in the initial form. In developing family farms in various places, attention has been paid to combining the advantages of family business and farm mechanization. As a result, it has been possible to better utilize the labor force, take advantage of large-scale operations, and benefit from advanced technology.

2. The economy has developed from the closed type to the open type, and a multiform and multilayered mode of economic association has begun to appear.

3. Both the structure of agriculture and the structure of production are being steadily readjusted, and the proportion of the industrial output value of farmland reclamation departments to their total industrial and agricultural output value is rapidly increasing. It is estimated that their industrial output value in 1986 will amount to some 9.8 billion yuan and approximately account for 53 percent of their total industrial and agricultural output value.

4. In management, a unified process of production, processing and marketing has been established step by step, and production and marketing have gradually become coordinated with each other.

In the 7 years 1979-1986, farmland reclamation departments in China earned a total of 4.5 billion yuan to the state. During the Sixth 5-Year Plan, their total industrial and agricultural output value increased at an average annual rate of 10.8 percent. Facts show that the economy of the farmland reclamation departments in China has entered a stage of steady and coordinated development. In this year, the farmland reclamation departments, seriously implementing the guidelines of the documents adopted by the central authorities, have further enhanced the enthusiasm of their cadres and workers. It is estimated that their profits will amount to 890 million yuan this year, despite higher prices of the means of production, higher wages and the natural disasters that distressed some reclamation areas.

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CSO: 4007/68

BEIJING RADIO SAYS RURAL REFORM TO BE CONTINUED

OW241425 Beijing Domestic Service in Mandarin 1200 GMT 20 Nov 86

[Station commentary: "Reform Will Remain a Major Rural Task in the Future"]

[Text] Since the introduction of the system of contracted responsibilities on the household basis with remuneration linked to output, the economic reform in rural areas has undergone two stages and lasted for 5 or 6 years. As time passes by, people have had sufficient facts as evidence for the success of this reform. No one can deny that the situation in China's countryside today is surely becoming better and better.

Faced with this situation, some comrades think what we have done is good enough. In their opinion, nothing remains to be done in rural reform, except for some corrective and supplementary jobs. In fact, this idea is by no means acceptable. We have depended on reform to create an excellent situation in our rural areas. To develop this excellent situation, we still have to depend on reform.

For a certain period from now on, all localities should develop and invigorate the rural commodity economy as the key task of reform while continuing their unremitting efforts at grain production. They should vigorously set up targets, formulate policies, and do a great deal of work in connection with this key task. The primary work to be done at present is to provide peasants with still better services before, during and after production and to develop a multilayered socialized service trade in rural areas involving various economic sectors and operational forms. Success in this work will not only help consolidate the fruitful results of rural reform in the past few years, but will also radically stimulate the transformation of the natural rural economy to a commodity economy. In addition, our country's question regarding market is a question of rural market, in the final analysis. Invigorating the circulation of commodities in rural areas is of vital significance to the whole national economy. In view of this, it is hoped that our comrades doing rural work in all localities will pay more attention to the reform of the rural commodity-circulation system in the coming year or for an even longer time to come.

It should be made clear that all our reform measures implemented in rural areas should be based on the principle of continuously increasing the peasants' income. The reforms carried out over the past few years have given certain benefits to peasants. No departments and units should take back these benefits in one way or another. It should be noted that only when the peasants have a better income can they spend more on agriculture, and this is the only way to increase the rural market capacity. In a certain sense, to keep the upward trend of the peasants' income is to ensure an upward trend of the growth of the national economy.

To sum up, we should continue to persist in reform and, while ensuring a fairly big increase in grain production, promote the all-round development of the commodity economy and bring about a sustained and steady economic growth in rural areas. This will be the general framework of our next year's rural work. It is hoped that all comrades devoted to rural reform will continue to give play to their talent and resourcefulness so as to further the work of rural reform.

/8309
CSO: 4007/70

VILLAGE MARKET STRESSED FOR INDUSTRIAL PRODUCTS

OW221030 Beijing XINHUA Domestic Service in Chinese 0019 GMT 21 Nov 86

[Excerpts] Beijing, 21 Nov (XINHUA)--Report by XINHUA reporter Chen Yun: The Importance of the Countryside as Major Markets for Industrial Products Must Not Be Underestimated.

Autumn is over. The peasants have more cash on hand after harvest and need to make some purchases. Markets in the countryside are entering a busy season. But, according to this reporter's understanding, it is still relatively difficult for peasants to get access to needed commodities due to many obstacles hindering the distribution of industrial products to the countryside. This problem needs to be addressed urgently.

Many causes, including ideological ones and reasons of working or objective conditions, have hindered the free flow of industrial products to the countryside. Since commodity control became relaxed and commodity allocation became freer, some commercial departments and enterprises have stopped handling the supply of industrial products to the countryside under the mistaken impression that there are now more channels for the flow of commodities between cities and towns and that state-run businesses no longer have to undertake the tasks of distributing industrial products to the countryside. This misunderstanding has led to neglect of the distribution of industrial products to the countryside.

Both commercial departments and industrial production departments are to blame for causing the difficulties of the countryside in obtaining industrial products. As some products are unmarketable, the departments concerned simply compel commercial supply and marketing enterprises to take those products in tie-in sales. How can the small commercial supply and marketing departments operating on marginal profits in the countryside survive this kind of tie-in sale system?

Under the new situation of relaxing control to invigorate the economy, the old method of planned allocation has been discarded. How can we give full support to the role of multiple channels in doing a good job of distributing industrial products to the countryside? Quite a few localities have made useful trials which are good examples for all localities to follow. Some localities persist in giving full scope to the role of supply and marketing cooperatives as the

main distribution channel in the countryside and in this endeavor they have achieved very good results. Some other localities have made large wholesale enterprises extend their service to the countryside. For instance, the wholesale points of industrial products, established by five large wholesale enterprises under the First Commercial Bureau of Tianjin municipality, have increased by more than 50 percent since the beginning of this year. Furthermore, they have set up business departments in urban-rural border areas for customers to make their choice, place orders, and take deliveries of commodities on the spot. This practice has resolved the difficulty faced by peasants over the years in having to travel to cities to take delivery of their purchases, and has promoted the distribution of industrial products to the countryside.

In addition to these methods, many localities have developed diverse forms of joint operations and marketing chains to promote distribution of industrial products to the countryside.

Many localities have even organized various types of trade fairs and order-placement meetings in the countryside and increased the frequency of industrial products delivery to remote districts.

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CSO: 4007/70

MORE LAND ALLOCATED TO GRAIN OUTPUT

HK220328 Beijing CHINA DAILY in English 22 Nov 86 p 3

[By staff reporter Nie Lisheng]

[Text] China has expanded its grain sowing acreage this season by about 0.73 million hectares, or 2.6 percent over last year, in an effort to raise its grain production in 1987 above 405 million tons, a target it failed to reach this year.

The country's total sown acreage for all next year's summer crops--including rapeseed--increased by 0.113 million hectares to 42 million hectares, CHINA DAILY learned from a national conference on agriculture that closed in Beijing on Thursday.

But the relatively dry weather and the shortage of fertilizers are affecting the prospects for a bumper harvest next year. In some areas in North China, signs of drought have appeared following unusually warm weather, causing overgrowth of some wheat shoots that may lead to problems in the cold weather.

During the past sowing season, most of the country has been short of fertilizers and in some areas, farmers have even run out of stock. As the result of insufficient use of base fertilizers, crop shoots are not doing well in many areas.

The conference called on all local agricultural authorities to organize farmers for irrigating and fertilizing sprouting fields. The Ministry of Chemical Industry has decided to increase this year's fertilizer production by another 3 million tons to meet farmers' needs.

To ensure the steady growth of grain production, participants at the conference agreed that the country's total grain sown acreage should be kept stable at 110 million hectares a year. In 1985, grain output dropped to 380 million tons from the record level of 405 million tons in 1984 due to a sharp reduction in sown acreage. But this year, grain output pciked up to over 390 million tons thanks to expanded acreage.

By 1990, China plans to produce 425 to 450 million tons of grain. That means it has to increase grain output by 10 to 15 million tons annually in the next 4 years. Next year it is expected to make up for the goal it has missed this year--equalling 1984's record level of 405 million tons.

The participants agreed that increasing grain production will be a hard, long-term task for China's agriculture. Even if China raised annual grain output to 450 million tons by 1990, the figure per capita would drop by 16.5 kilograms to 378.5 kilograms from the 1984 level of 395 kilograms because of the population increase.

They held that future grain increases would mainly depend on farmers' enthusiasm for grain production.

But under the present strained financial conditions, it will be impossible for any big rises in state grain purchasing prices except for some slight increases for a few varieties of crops. This is not much of an incentive for grain growers, who are now earning much less than farmers engaged in rural commerce and industries.

Supplies of agricultural production materials such as fertilizers and diesel oil will be increased, but they will probably not be enough.

The participants urged that special efforts should be made to introduce high-yield varieties of crops in more areas.

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CSO: 4020/47

RENMIN RIBAO NOTES INCREASE IN AQUATIC PRODUCTS

OW241122 Beijing XINHUA in English 0716 GMT 24 Nov 86

[Text] Beijing, November 24 (XINHUA)--China expects to produce eight million tons of aquatic products this year to become the world's third-largest producer, today's PEOPLE'S DAILY reported.

It has seen its output of aquatic products increase by nearly one million tons a year for the past few years. In 1984, the aquatic output was 6.19 million tons and in 1985, 7.05 million tons, the paper said.

The paper attributed the increase to the current policy of allowing prices for aquatic products to float according to market demand, the paper said.

Raising fish in fresh water has been given a boost over the past few years. In 1985, fish raisers got in 2.3 million tons of fish from 366 million hectares of freshwater fish farms, the paper said.

Scientists have also cultivated some high-yielding and fine-quality fish varieties while introducing foreign varieties and protecting offshore fish resources, the paper reported.

Moreover, the technique of storing aquatic products and fish processing have been improved, the paper said.

China's ocean fishing fleet has also contributed to the increase. Now China has 30 ocean-going fishing vessels.

The fleet brought back 3,000 tons of fish last year and this year they will produce more, the paper said.

/8309
CSO: 4020/50

MASSIVE VEGETABLE SHIPMENTS SUPPLY NORTHERN CITIES

HK250306 Beijing CHINA DAILY in English 25 Nov 86 p 3

[Text] Half a million tons of fresh vegetables are expected to arrive from South China over the next few months to ease shortages in Beijing, Tianjin and other parts of North China during the winter season.

This massive consignment of vegetables which will fill a total of 18,000 railway freight trucks, marks a 22 percent increase on last year's total supply of vegetables from south to north China, according to the Beijing-based COMMERCIAL NEWS.

This was disclosed at a recent conference held by the Ministry of Commerce and the Ministry of Railways in Zhangzhou, Fujian Province. A spokesman said the vegetables will be supplied to Beijing, Tianjin, Northeast and Northwest China by the southern provinces of Guangdong, Fujian, Yunnan and Sichuan provinces and also the Guangxi Zhuang Autonomous Region.

Guangdong Province--the major supplier--will send 190,000 tons of fresh vegetables to the north this winter. Beijing and Tianjin--the major recipients--will get a total of 100,000 tons of vegetables from the south, the conference was told.

The Ministry of Commerce started organizing the supply of vegetables from south to north two years ago, following the nationwide reforms which allow free trading in vegetables across China.

Since then, organized vegetable supply from south to north China has been increasing at an annual rate of 20 percent, COMMERCIAL NEWS said.

The large-scale supply of vegetables to the north has not only eased the winter shortage of fresh vegetables in northern cities but has also helped to raise the income of farm producers in southern provinces, where a large variety of vegetables are grown all year round.

By organizing a steady supply of winter vegetables to northern provinces, the south can give its farmers more work to do during their usually slack winter months, the report said.

In Beijing and Tianjin, the supply of vegetables during winter and early spring mainly depended on stored cabbages or expensive greenhouse produce, until recently. Local residents there were often urged to store several hundred kilograms of autumn cabbage in their own crowded houses or apartments to supply them during the winter.

The cabbage-selling and storing drive organized by Beijing City each winter had always been a hectic event, because tons of newly harvested cabbage had to be sold and stored before the freezing weather started.

This year, Beijing Municipality relaxed its winter vegetable-saving drive, to the delight of local consumers and vegetable dealers and thanks to the increasing supply from the south.

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CSO: 4020/50

EXPERT REVEALS ROSIN PRODUCTION LEADS WORLD

OW280343 Beijing XINHUA in English 0233 GMT 28 Nov 86

[Text] Nanning, November 28 (XINHUA)--China has become the world's leading rosin producer, with an annual output of more than 400,000 tons, a leading Chinese forestry expert announced today.

"China will increase its rosin exports as it has great potential in the forestry by-product industry," said He Jinke, China's first academician of the international academy of world science, at a national meeting on forestry by-product chemistry and utilization, now in session in the capital city of south China's Guangxi Zhuang Autonomous Region.

The forestry by-product industry is the processing and chemical separation of secretions from trees caused by wounds and insects. Rosin, raw lacquer, rubber and white wax fall into this category.

"Over 500 counties in China's 23 provinces have grown 200 kinds of trees, accounting for 80 percent of the world's resources in this field," said He Jinke, who is also a fellow of the research institute of chemical processing and forest utilization.

Masson's pine, the main species for producing rosin, covers 400,000 hectares of land in 15 southern China provinces.

China also grows 14 kinds of wallnut trees which are distributed in 19 provinces and regions. Some species from other countries, such as slash pine and black thorn, were also introduced to China.

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CSO: 4020/50

RESEARCH ON GRAIN, CASH CROP DEVELOPMENT REPORTED

Beijing ZHONGGUO NONGCUN FAZHAN WENTI [ISSUES IN RURAL DEVELOPMENT] in Chinese Nov 1985 pp 377-456

[Article by Chinese Academy of Agricultural Sciences Grain and Cash Crop Development Research Group: "Research on China's Grain and Cash Crop Development"]

[Text] Agriculture is the foundation of the national economy. In agricultural production grain and cash crops constitute primary production, and the rate at which they develop directly affects the state of agricultural development and even growth in the overall national economy. Initiating projections of grain and cash crop growth and studies of planting composition are crucial to quadrupling the gross value of national industrial and agricultural output by the end of this century.

The methods we have adopted to conduct this research are as follows: First, we proceed from a comprehensive viewpoint encompassing agriculture, forestry, animal husbandry, sidelines, and fishery: we combine grain and cash crop development with forestry, animal husbandry, sidelines, and fishery development and undertake a multipurpose, multilevel quantitative analysis. Second, we integrate inputs, outputs, and adopted administrative, economic, and technical measures to conduct feasibility studies. Third, we carry out a system synthesis study based on research and demonstration of 13 special topics, 28 crops, and the locations of China's 6 agricultural districts.

The contents of this report are divided into 6 parts: I. Projected Growth of Social Demand for Major Agricultural Products; II. Projected Growth in Output for Major Agricultural Products; III. Measures We Must Adopt To Achieve Projected Growth Targets; IV. A Regional Location Study; V. Discussion of a Few Problems; VI. Major Conclusions.

I. Projected Growth of Social Demand for Major Agricultural Products

The fundamental goal of socialist production is to satisfy continually society's ever-increasing needs. Right now food and clothing constitute 70 percent or more of urban and rural consumer living expenses in China. The vast majority of raw materials for food and clothing come from agricultural products. Marx once pointed out that "A society cannot halt consumption, and

likewise it cannot halt production." (Footnote 1) (Karl Marx: "Das Kapital," Vol 1, p 619) It is precisely this cycle of unending production and consumption that lays the foundation for social and economic development.

The 12th Party Congress of the CPC suggested that by the end of this century the gross value of industrial and agricultural production will be quadruple its 1980 base level and the people will have a confortable standard of living. In realizing this macroeconomic goal we must particularly ensure that people are well-fed and well-clothed, and the foundation for this lies in developing agriculture and satisfying demands from all quarters for agricultural products.

A. Analysis of Relevant Factors Affecting the Quantity of Social Demand

1. Population and Population Structure

In Chinese economic and social development the population problem has consistently been one of the most crucial factors. From 1952 to 1982 China's total population rose from 574.82 million to 1,015.41 million people--an increase of 77 percent during that period. In the wake of the constant population increase the social demand for agricultural products has also grown tremendously. If we look at the daily consumption of grain, pork, and cotton alone, the quantities consumed in 1982 were 2.02 times, 2.30 times, and 2.48 times, respectively, what they were in 1952. If we compare the rates of average yearly increase, during that 30 years population grew at an average rate of 1.9 percent per year; grain, pork, and cotton output increased at an average annual rate of 2.6 percent, 3.8 percent, and 3.3 percent, respectively; and consumption of these products rose at an average annual rate of 2.4 percent, 2.8 percent, and 3.1 percent, respectively. The standard of living can only improve if production increases at a rate distinctly higher than the rate of population increase. If the production growth rate is not sufficiently higher than the population growth rate the increase in agricultural products for the most part can only be consumed by the new population increment and the standard of living cannot be improved. This is a fundamental restriction. The quantity of social demand in this article is calculated based on the assumption that total population will be held to base figures of 1.12 billion in the year 1990 and 1.2 billion in the year 2000. A look at the state of family planning implementation in the past few years shows that we have not attained the targeted 1.3 percent natural population increase demanded in the Sixth 5-Year Plan. For the nation as a whole, in 1981 the average birth rate was 2.091 percent and the death rate was 0.636 percent, for a 1.455 percent rate of natural increase. This exceeds the planned target by 0.155 percent. It looks as if it will still be a difficult task for us to realize the population control objective cited above.

In addition, if we look at population structure, according to data published in the Third Population Census the age composition of the Chinese population is young: over 40 percent of the population has already entered the child-bearing period and 42.5 percent of the population is about to enter the child-bearing period. Also according to statistics, in 1982 the social labor force in all sectors of the national economy amounted to 447.08 million people, or 44 percent of the total population. It is predicted that by the end of the

century one-third of these laborers will be elderly and retired but nearly 300 million of them will still be working. At the same time, between 1965 and 1982 310.42 million people were born, and by the end of the century this portion of the populace will be in their prime labor years. Combining these two figures, we find that at the end of this century we will have 608.47 million people of working age, accounting for 50.7 percent of the 1.2 billion population. This trend of population growth and changing composition should be our basic starting point for forecasting the growth of social demands.

2. Income and Consumption Levels

In the past the Chinese economy was very backward and the people lived in dire poverty. In 1949, when the nation was liberated, the gross value of industrial and agricultural output was 46.6 billion yuan and the average per capita income was only 66 yuan. After 3 years of recovery, in 1952 the gross value of industrial and agricultural output reached 82.7 billion yuan and the average per capita income increased to 104 yuan. At this fairly low income level the people's daily consumption level continued to be very low. According to statistics, in 1952 people consumed 395 jin of grain (here and below, this refers to trade grain), 4.2 jin of edible vegetable oil, 11.8 jin of pork, and 17.1 chi of cotton cloth per capita nationwide.

After construction through several 5-year plans, and particularly due to the adoption of a series of advantageous production development policies after the 3d Plenum of the 11th Central Committee of the CPC, in 1982 the gross value of social production reached 989.4 billion yuan, constituting an available national income of 425.4 billion yuan. Excluding accumulation funds and public consumption, individual consumption totalled 322.1 billion yuan, or 297.5 yuan per capita. Concomitant individual incomes likewise rose. According to a sample survey, in 1982 the average per capita income in urban working families was 535.32 yuan, of which 500.28 yuan could be spent on living expenses, and the average per capita income in farming households was 270.11 yuan, of which 220.23 yuan could be spent on living expenses. Because income increased, the level of consumption also increased. In 1982 average per capita consumption nationwide had reached 451 jin of grain, 7.07 jin of edible vegetable oil, 23.5 jin of pork, and 30 chi of cloth.

It is worthwhile to point out that in the past few years the economic situation has developed rapidly. Between 1981 and 1983 the gross value of industrial and agricultural output increased 7.8 percent per year, exceeding the 7.2 percent yearly average growth rate scheduled for the 20 year period from 1981 to 2000. If this trend continues we not only can achieve our goal of quadrupling the gross value of industrial and agricultural output, we can even achieve it ahead of schedule.

If we look at historical circumstances, in general the gross value of industrial and agricultural output must account for 80 percent or more of the gross value of social production. Consequently, we can predict that by the end of this century China's gross value of social production will also have quadrupled. Furthermore, figuring that national income accounts for 43 percent of the gross value of social production, by 1990 China's average per capita national income will reach 652 yuan, and by the year 2000 it will reach

1,218 yuan. Based on the ratio of accumulation to consumption set by the state during each previous 5-year plan, and based on an analysis of the role this plays in national economic development and people's living arrangements, we predict that an accumulation to consumption ratio of 25:75 will be suitable for the years 1990 and 2000. Furthermore, based on current consumption funds, individual consumption will generally account for 88 percent. Calculating from this, by 1990 individual buying power (consumption fund) may reach 431 yuan, and by 2000 it may reach 804 yuan. According to Engels Law--that as income increases the proportion used to buy food will gradually decrease--if we project food and clothing consumption from the current level of 70 percent of all expenditures, then in 1990 people will be able to pay 302 yuan for food and clothing. In the year 2000, because the standard of living will have risen further, we predict that the composition of consumption will change and the portion of funds used to buy food and clothing will decline to 60 percent. This portion of buying power will amount to 482 yuan (see Table 1). Following new increases in buying power, the people will advance greater and greater demands for agricultural products and other consumer goods.

Table 1. Forecast of Per Capita Income in China in 1990 and 2000 (in billion yuan)

Item	Year	1990	2000
Gross value of social production		1,699.2	3,398.4
National income (figured at 43% of the gross value of social production)		730.7	1,461.3
Accumulation (figured at 25% of national income)		182.7	365.3
Consumption Fund	Total (75% of national income)	548.0	1,096.0
	Public consumption (12% of consumption fund)	65.8	131.5
	Individual consumption (88% of consumption fund)	482.2	964.5
Average per capita expenditures (in yuan)		431	804
Component amount usable for food and clothing (in yuan)		302	482

3. Changing Trends in Urban and Rural Consumption

Because history has given rise to major disparities between urban and rural areas in China, changes are now occuring to alter the gap in consumption levels. According to statistics, in 1952 nationwide consumption among urban and rural residents broke down as follows: city and town residents consumed 481 jin of grain (trade grain), 10.2 jin of vegetable oil, 17.8 jin of pork, and 40.19 chi of cotton cloth; village residents consumed 383 jin of grain (trade grain), 3.4 jin of vegetable oil, 11 jin of pork, and 11.51 chi of cotton cloth. In a comparison of the two, city and town residents clearly consumed more than village residents, as follows: urban areas consumed

approximately 1.26 times as much grain, 3.00 times as much vegetable oil, 1.62 times as much pork, and 3.49 times as much cotton cloth as did rural areas.

However, in the wake of rural economic development, the urban/rural disparity is now gradually shrinking. According to 1982 rural sample survey results and statistics from 47 large, medium, and small cities, urban working families consumed an average that year of 361 jin of grain (unprocessed food grains), 11.5 jin of vegetable oil, 41.5 jin of pork, and 39.4 chi of cloth (including all kinds of woven goods) per person; rural residents consumed 520 jin of grain (unprocessed food grains), 6.86 jin of vegetable oil, 18.1 jin of pork, and 25.32 chi of cloth. In a comparison of the two, the consumption disparity between city and town residents and village residents has shrunk notably: urban areas consume approximately 0.69 times as much grain, 1.69 times as much vegetable oil, 2.31 times as much pork, and 1.56 times as much cloth as do rural areas. By comparison with 1952, excepting a slower increase in pork consumption in rural areas than in urban areas, consumption of these items has grown faster in rural areas. In particular, rural grain consumption has surpassed that of urban areas. Generally speaking, because of a series of policies we have adopted, in the past few years the standard of living has improved faster in rural than in urban areas. According to statistics, comparing 1983 with 1978 shows that there has been a 66.5 percent cost-of-living increase in workers' incomes, whereas there has been a 130 percent increase for peasants.

The gap between peasants and workers in their daily consumption levels is now shrinking. If we assign a value of 1 to peasant consumption expenditures, a comparison of worker and peasant expenditures shows a ratio of 1:2.68 in 1979 and 1:2.04 in 1983. Furthermore, from the perspective of the rate of increase in consumer goods turnover, rural areas far surpass urban areas. In 1983 China turned over 241.2 billion yuan worth of consumer goods, up 10.6 percent over 1982. Of this, 117.6 billion yuan was consumed in urban areas, for an increase of 7.9 percent over 1982, and 123.6 billion yuan was consumed in rural areas, for an increase of 13.2 percent over 1982. Right now, as far as food is concerned, peasants want to improve staple foods (in 1983 rural grain sales, the proportion of flour and rice rose to 81 percent from 78 percent the year before), increase nonstaple foods (in 1983 nonstaple foods sold in rural areas increased from 77 percent to 80 percent of retail food sales and, of this, meat, poultry, and egg sales increased 10 percent, sugar sales rose 13 percent, candy sales grew 12 percent, pastry sales increased 18 percent, and beer sales rose 42 percent), and sharply increase sales of high-quality foods and nutriments (some have grown 50 to 120 percent). As far as clothing is concerned, there is also a development away from primarily cotton textiles and toward diversity (in 1983 the quantity of cotton textiles sold in rural areas declined 21 percent, whereas synthetic and woolen textile sales increased 29 percent). In another area, following the restructuring of the rural economic system the composition of labor within agriculture is undergoing a profound change. According to predictions made by the departments concerned, due to the development of township and town enterprises and other diversified economic operations, by the end of this century 40 percent of the rural labor force will have switched to industry, commerce, and services, and will be participating in building small market towns. Although the 300 million peasants who leave the land but not the countryside will continue to live in

rural areas, the character and intensity of their labor will gradually approach that of urban workers. Consequently, their demands for food and clothing will also tend toward urban consumption levels. The changes described above, which are just developing, will inevitably have a direct affect on the the future quantity and quality of demands for agricultural products.

4. The State of Trade on Domestic and International Markets

In the past few years, in the wake of the development of specialized, commercialized production, China's commodity ratio in farm and sideline products has improved tremendously. In 1983 state-run commerce and supply and marketing cooperatives purchased 97.5 billion yuan worth of agricultural and sideline products, up 14 percent over the previous year. If we eliminate the element of increased procurement prices, growth was still 12.8 percent. Of this, grain procurement totalled 193.47 billion jin, up 34.2 percent over the same period of the previous year, and there were 441 counties in which commodity grain sales exceeded 100 million jin. Cotton procurement measured 91.68 million dan, for an increase of 34.3 percent over the same period of 1982. Procurement of apples, citrus fruits, chrysanthemums, and Auricularia fungi increased 11 to 48.5 percent from 1982 to 1983, and procurement of fresh eggs, beef, and cattlehide rose 3.2 to 53.3 percent. From this it is obvious that the improvement in grain production in China has stimulated development in agricultural commodities production. Furthermore, from the perspective of the foreign trade situation, in 1952 there were 70 or 80 kinds of export commodities, and agricultural and sidelines products (here and below this includes processed goods) accounted for 82 percent of them. Later, in the wake of expanding domestic demand for agricultural products, as well as the gradually increasing quantity of industrial exports, the proportion of total exports composed of agricultural and sideline products gradually declined, receding to 39.5 percent by 1982. Due to an increase in agricultural imports the unfavorable trade balance in farm products reached 5,032,000,000 yuan. Of this, the trade deficit amounted to 2,395,000,000 yuan for foods and live animals primarily used for food, 61,000,000 yuan for beverages and tobacco, 2,521,000,000 yuan for unprocessed grain, and 55,000,000 yuan for animal and vegetable oils. Due to continuous large-scale increases in the production of grain, cotton and other staple agricultural goods, in the past 2 years this situation has changed. Now China has reduced grain imports and we export small quantities of vegetable oil and cotton. In light of increasing domestic yields of agricultural products, we must continue to develop exports. Right now world trade is characterized by rapid growth in grain, cotton, and food trade, while trade in the major cash crops is developing slowly. Moreover, market competition is intensifying over the major cash crops and, for a great many of them, supply and demand is unstable and prices soar and plummet by turns. In the midst of all this, trade in high-value goods is increasing, while exports of low-value goods are decreasing. The domestic sales and foreign trade situations described above will inevitably affect the demand for agricultural products.

B. Predictions of Demand in the Years 1990 and 2000

Based on an analysis of the above factors that affect the quantity of social demand, we adhere to the following principles in predicting demand: 1) We follow the predictions of the state-formulated Population Development Plan concerning the total population and the structural population changes that will be reached at particular times; 2) Based on production increases, income growth, and improvements in buying power, we correspondingly increase nutritional levels and clothing standards; 3) We observe a general narrowing trend between urban and rural consumption characteristics and disparities; 4) In commodity production and foreign trade development we account for changes in demand; 5) We account for developments in the food industry, the socialization of society, and improvements in communications, transportation, processing, and preservation.

1. Dietary Composition

In the wake of national economic growth, in the past few years dietary composition among the Chinese people has gradually improved. However, generally speaking, our nutritional level is still quite low. Based on an analysis of certain data extracted from representative surveys conducted by the Health Institute of the Chinese Academy of Medical Sciences and other units, each peasant assimilates an average of approximately 2,300 kcals per day and each urban resident assimilates an average of about 2,400 kcals per day. However, over 90 percent of this comes from plant foods, and the proportion of protein in the food is very low. In order to improve people's nutritional level we must improve the existing dietary composition. We must both consider the traditional emphasis on plant foods in the Chinese diet and suitably increase the proportion of animal foods to improve the health level. We have made some calculations based on this principle, and we propose the following three dietary composition plans (see Tables 2 and 3).

Table 2. Current and Forecasted Dietary Composition (in jin)

Item	1982 (current)			1990			2000		
	National average	Urban	Rural	Plan 1	Plan 2	Plan 3	Plan 1	Plan 2	Plan 3
Cereals	391	294	416	420	490	471	330	431	376
Beans	—	—	—	24	24	24	36	32	36
Fresh potatoes	—	—	—	72	60	72	72	60	72
Meats	24.3	41.8	19.7	36	30	36	60	45	60
Dairy products	2.7	9.0	1.0	20	19	22	60	40	60
Eggs	4.7	11.8	2.9	12	9	12	24	20	24
Fish	5.3	15.3	2.6	12	8	12	18	11	18
Vegetable oil	7.8	11.6	6.9	9	9	9	12	12	13
Sugar	3.6	8.1	2.4	12	12	12	12	12	13
Vegetables	276.0	318.0	264.0	279	250	279	240	250	240
Fruits	12.0	32.2	7.4	24	24	24	40	37	50

Explanation: 1) The 1982 (current) series is calculated based on data

from workers households in 47 small, medium, and large cities nationwide, as published in the 1983 Statistical Yearbook, as well as on rural sample surveys conducted throughout China.

2) The 1982 figures for cereal consumption include beans, potatoes and other kinds of cereals, and the urban and national figures both refer to finished grain products.
3) Meats include pork, beef, mutton, rabbit, and poultry.

Table 3. Nutritional Composition of Current and Forecasted Diets

Item	1982 (current)	1990 Plan 1	1990 Plan 2	1990 Plan 3	2000 Plan 1	2000 Plan 2	2000 Plan 3
Heat (in kcals)	2,251	2,413	2,608	2,612	2,400	2,616	2,602
% derived from plant foods	92.0	87.6	90.6	88.6	78.3	85.1	79.9
% derived from animal foods	8.0	12.4	9.4	11.4	21.7	14.9	20.1
Protein (in grams)	55.3	68.1	72.2	73.2	73.2	76.2	77.7
% derived from plant foods	90.5	84.9	88.9	85.8	74.9	82.0	76.3
% derived from animal foods	9.5	15.1	11.1	14.2	25.1	18.0	23.7

Plan 1: The grain ration will be fairly low and the quantity of animal foods will be rather high (in 1990 the average per capita grain ration will be 1.26 jin per day or 458.4 jin per year, and in 2000 it will be 1.04 jin per day or 380.4 jin per year; in 1990 the average per capita meat consumption will be 0.10 jin per day or 36 jin per year, and in 2000 it will be 0.16 jin per day or 60 jin per year). In the years 1990 and 2000 the average per capita caloric value will total 2,413 kcals and 2,400 kcals, respectively, and the proportion derived from animal foods will measure 12.4 percent and 21.7 percent, respectively. The diet will contain 68.1 grams of protein in 1990 and 73.2 grams in 2000, while the proportions derived from animal foods will measure 15.1 percent and 25.1 percent, respectively.

Plan 2: The grain ration will be fairly high and the quantity of animal foods will be rather low (in 1990 the average per capita grain ration will be 1.44 jin per day or 526 jin per year, and in 2000 it will be 1.30 jin per day or 475 jin per year; in 1990 the average per capita meat consumption will be 0.08 jin per day or 30 jin per year, and in 2000 it will be 0.12 jin per day or 45 jin per year). In the years 1990 and 2000 the average per capita caloric value will total 2,608 kcals and 2,616 kcals, respectively, and the proportion derived from animal foods will measure 9.4 percent and 14.9 percent, respectively. The diet will contain 72.2 grams of protein in 1990 and 76.2 grams in 2000, while the proportions derived from animal foods will measure 11.1 percent and 18.0 percent, respectively.

Plan 3: The grain ration will be moderate and the quantity of animal foods will be rather high (in 1990 the average per capita grain ration will be 1.40 jin per day or 509.4 jin per year, and in 2000 it will be 1.70 jin per day or 426.4 jin per year; in 1990 the average per capita meat consumption will be 0.10 jin per day or 36 jin per year, and in 2000 it will be 0.16 jin per day

or 60 jin per year). In the years 1990 and 2000 the average per capita caloric value will total 2,612 kcals and 2,602 kcals, respectively, and the proportion derived from animal foods will measure 11.4 percent and 20.1 percent, respectively. The diet will contain 73.2 grams of protein in 1990 and 77.7 grams in 2000, while the proportions derived from animal foods will measure 14.2 percent and 23.7 percent, respectively.

As to the nutritional level offered by these dietary compositions, in the first plan the average per capita caloric value will be 2,400 kcals or a little more, and in the second and third plans it will be 2,600 kcals or a little more. Between 1990 and 2000 the caloric values will remain essentially unchanged but the protein content will rise in each of the diets: in 1990 it will measure 68.1 to 73.2 grams, and in 2000 it will measure 73.2 to 77.7 grams. The common ground in the three plans is that to varying degrees they all increase the proportion of animal foods in the diet. Consequently, the proportions of caloric value and protein derived from plant foods gradually decline and the proportions derived from animal foods gradually climb. In this way nutritional levels are improved in all three plans.

2. Garment Composition

We predict that we will build upon our current consumption level of 22 chi of assorted cloth per capita per year and raise it to about 32 chi per capita per year. Furthermore, there will be suitable increases in consumption of synthetic blends, woolens, silks and satins. By the year 2000 people will be consuming 38 chi of assorted cloth per capita per year (of which synthetic blends will constitute 60 percent). If we add in the demand for other cotton woven goods, the total amounts to 4.8 jin of raw cotton, and there will also be a need for 2.0 chi of wool cloth, 0.26 jin of wool yarn, and 5.0 chi of silks and satins (see Table 4).

Table 4. Garment Composition

Type	Unit	1990		2000	
		Quantity needed	Cotton equivalent (in jin)	Quantity needed	Cotton equivalent (in jin)
Cotton garments	each	2.5*	1.80	2.10	1.50
Synthetic garments	each	2.00**	0.54	3.30	0.92
Interlock cotton shirts and pants	each	0.50	0.07	1.00	0.14
Sweatsuits	each	0.10	0.15	0.10	0.15
Sleeveless undershirts	each	1.00	0.24	1.50	0.36
Towels	each	1.50	0.24	2.00	0.32
Socks	pair	1.00	0.03	1.00	0.03
Sheets	each	0.30	0.53	0.50	0.88
Cotton wadding	jin	0.50	0.50	0.50	0.50
Wool yarn	jin	0.19		0.26	
Wool fabric	chi	0.75		2.00	
Silk and satin	chi	2.00		5.00	
Total			4.10		4.80

Notes: 1) Each garment requires about 7 chi of cloth.
2) Synthetic cloth containing 40% cotton requires 0.04 jin of cotton for each chi of cloth.
3) *Amounts to 18 chi of cloth.
**Amounts to 13.5 chi of cloth.

3. Other Social Needs

a. Grain

In addition to food we use grain in the following ways: 1) Seed grain: Considering the possibility that future improvements in seed quality and the adoption of precision seed drilling will conserve on the quantity of seed we use, we calculate that, at 23 to 25 jin per mu, we will need 43.5 billion jin in 1990 and 40 billion jin in 2000. 2) Feed grain: Figured at a grain to meat ratio of 3.3:1 in 1990 and 3.2:1 in 2000 (excluding bran, rice dregs cakes, and so forth), in 1990 we will need 223.8 billion jin (for Plan 1), 189.7 billion jin (for Plan 2), or 224.3 billion jin (for Plan 3); and in the year 2000 we will need 290.8 billion jin (for Plan 2) or 369.3 billion jin (for Plan 1 or 3). 3) Industrial grain, including grain for brewing, pharmacy, spinning and weaving, and other industrial uses: In 1990 we will need 50.0 billion jin (calculated at about 6 percent of total grain output), and in the year 2000 we will need 100.0 billion jin (calculated at about 10 percent of total grain output). 4) New increments in reserves: Calculated based on the quantity of grain needed in a year for the new population increment, we will need 600 to 700 million jin in 1900 and 800 million to 1.0 billion jin in 2000. 5) Spoilage: if we analogize from the current spoilage rate of about 3 percent, in 1990 we will need 25.0 billion jin and in 2000 we will need 28.0 billion jin. A total of the above 5 items shows that in 1990 we will need non-ration grain amounting to approximately 342.9 billion jin (for Plan 1), 308.9 billion jin (for Plan 2), or 343.5 billion jin (for Plan 3); and in 2000 we will need approximately 459.8 billion jin (for Plan 2) or 538.1 billion jin (for Plan 1 or 3) (see Table 5).

Table 5. Quantities of Grain for Non-ration Uses (in billion jin)

Use	1990			2000		
	Plan 1	Plan 2	Plan 3	Plan 1	Plan 2	Plan 3
Seed	43.5	43.5	43.5	40.0	40.0	40.0
Feed	223.8	189.7	224.3	369.3	290.8	369.3
Industrial material	50.0	50.0	50.0	100.0	100.0	100.0
New reserves increments	0.6	0.7	0.7	0.8	1.0	0.9
Spoilage	25.0	25.0	25.0	28.0	28.0	28.0
Total	342.9	348.9	303.5	538.1	459.8	538.2

b. Cotton

Cotton for non-garment uses includes cotton not used for spinning and weaving clothes or for cotton wadding: cotton owned by peasants for personal use,

commodity cotton for foreign trade exports, new increments in reserves, and spoilage. A total of these items shows we will need 39.77 million dan of non-garment cotton in 1990, of which 16 million dan will be exported, and we will need 45.65 million dan in 2000, of which 20 million dan will be exported (see Table 6).

Table 6. Quantities of Cotton for Non-garment Uses (in million dan)

Use	1990	2000
Non-textile industrial uses	2.75	3.28
Peasant-owned cotton	3.75	3.75
Foreign trade exports	16.00	20.00
New increments in reserves	15.98	17.07
Spoilage	1.29	1.55
Total	39.77	45.65

c. Other Major Cash Crops

Taking into consideration the demand brought about by improvements in the standard of living, industrial development, foreign trade and other factors by the years 1990 and 2000, we can calculate the demand for various items from current base figures: Oil crops--33.6 billion jin (1990) and 45.0 or 48.8 billion jin (2000); fiber crops--26.9 million dan (1990) and 33.2 million dan (2000); sugar crops--112.0 billion jin (1990) and 110.8 or 120.0 billion jin (2000); tobacco--27.97 million dan (1990) and 35.50 to 53.75 billion dan (2000); tea--9.30 to 11.54 million dan (1990) and 17.00 to 22.80 million dan (2000); fruit--32.5 billion jin (1990) and 54.0 to 72.0 billion jin (2000); vegetables--280.0 to 312.5 billion jin (1990) and 288.0 to 300.0 billion jin (2000) (see Table 7).

Table 7. Total Demand (grain, oil crops, sugar crops, vegetables and fruit are measured in billion jin; cotton, fiber crops, tobacco, and tea are measured in million dan)

1990

Item	Plan 1 Total	Plan 1 For domestic consumption	Plan 2 Total	Plan 2 For domestic consumption	Plan 3 Total	Plan 3 For domestic consumption
Grain	856.31	513.41	898.02	589.12	914.03	570.53
Cotton	85.69	49.67	85.69	49.67	85.69	49.67
Oil crops	34.4	33.6	34.4	33.6	34.4	33.6
Fiber crops	26.90	—	26.90	—	26.90	—
Sugar crops	112.0	112.0	112.0	112.0	112.0	112.0
Tobacco	27.97	22.32	27.97	22.32	27.97	22.32
Tea	9.30	6.00	11.54	7.64	9.96	5.96
Fruit	32.5	32.5	32.5	32.5	32.5	32.5
Vegetables	312.5	312.5	280.0	280.0	312.5	312.5

2000

Item	Plan 1 Total	Plan 1 For domestic consumption	Plan 2 Total	Plan 2 For domestic consumption	Plan 3 Total	Plan 3 For domestic consumption
Grain	994.58	456.48	1,029.80	570.00	1,049.88	511.68
Cotton	103.25	61.35	103.25	61.35	103.25	61.35
Oil crops	48.8	45.0	48.8	45.0	52.6	48.8
Fiber crops	33.20	—	33.20	—	33.20	—
Sugar crops	110.8	110.8	110.8	110.8	120.0	120.0
Tobacco	39.28	33.64	35.50	29.70	53.75	48.10
Tea	17.00	12.00	22.80	16.80	18.07	10.83
Fruit	57.6	57.6	54.0	54.0	72.0	72.0
Vegetables	288.0	288.0	300.0	300.0	288.0	288.0

C. Total Predicted Demand

1. Based on the Above Individual Estimates of Demand We Propose Three Scenarios for Total Demand

In the three scenarios for total demand, by 1990 we will need 856.31 to 914.93 billion jin of grain, or 764 to 816 jin per capita, and 60.0 to 62.4 percent of this will be used for food; by the year 2000 we will need 994.58 to 1,049.88 billion jin of grain, or 829 to 875 jin per capita, and 45.9 to 48.7 percent of this will be used for food. By 1990 we will need 85.69 million dan of cotton, or 7.7 jin per capita, and 53.6 percent of this will be used for clothing; by the year 2000 we will need 103.25 million dan of cotton, or 8.6 jin per capita, and 5.8 percent [figure as published] of this will be used for clothing. From this it is obvious that direct consumption of grain, cotton, and other daily necessities holds the dominant place in total demand. The above three plans are all calculated based on 1.12 billion people in 1990 and

1.2 billion people in 2000. If population increase exceeds the plan, each individual demand will also increase correspondingly. If population increases 5 percent by 2000, to 1.26 billion, the grain ration alone will have to rise approximately 23.34 billion jin; if population increases 10 percent, to 1.32 billion, the grain ration will have to rise 46.68 billion jin.

2. Total Social Demand Extrapolated as a Function of Consumption

The figuring behind each of the three plans is as follows: Plan A takes survey data on family livelihood as its basis and distinguishes urban and rural subpatterns; Plan B takes increases in national income as its basis; Plan C is based on time series patterns and expert opinion. If we synthesize the total demand produced using Plans A, B, and C, by 1990 we will need 826.7 billion jin of grain, 94.06 million dan of cotton, 298.80 million dan of oil crops, 826.46 dan of sugar crops, 27.30 million dan of jute and ambari hemp, and 21.37 million dan of flue-cured tobacco; in the year 2000 we will need 1,009.6 billion jin of grain, 112.50 million dan of cotton, 490.33 million jin of oil crops, 1,409.75 million dan of sugar crops, 32.42 million dan of jute and ambari hemp, and 24.70 million dan of flue-cured tobacco. If we compare total demand extrapolated in this manner with directly calculated total demand, the two are essentially similar.

II. Projected Growth in Output for Major Agricultural Products

The basic principle of socialist production is planned, proportional development. Forecasting production growth for the major agricultural products and providing feasible scientific demonstrations are the major foundation for formulating a program for long-term national economic development.

A. The History and Current State of Grain and Cash Crop Production

In 1949, when the PRC was established, agricultural production was at a very low level: gross grain output totalled only 226.36 billion jin, cotton yielded 8.88 million dan, and oil crop production measured 51.27 million dan. After 3 years of recovery, in 1952 the gross grain output totalled 327.8 billion jin, cotton yielded 26.08 million dan, oil crop production measured 83.86 million dan, and we produced 6.77 billion jin of meat. After 26 years of construction, in 1978 gross grain output reached 609.54 billion jin, cotton yielded 43.34 million dan, and oil crop production measured 104.36 million dan. During this period, although some progress was made in agricultural production, the steps in that progress were not big enough. If we compare 1978 with 1952, grain increased 85.9 percent, for an average annual growth rate of 3.3 percent; cotton rose 66.2 percent, for an average annual growth rate of 2.5 percent; oil crops expanded 24.4 percent, for an average annual growth rate of 0.9 percent, and meat rose 152.9 percent for an average annual growth rate of 5.9 percent.

In the past 5 years agricultural production has developed rather rapidly. In 1983 various crop yields set historic record highs: gross grain output totalled 774.56 billion jin, cotton yielded 92.74 million dan, and oil crop production measured 210 million dan. If we compare 1983 with 1978, grain

increased 27.3 percent, for an average annual growth rate of 5.5 percent, cotton rose 114 percent, for an average annual growth rate of 22.8 percent, and oil crops expanded 102.2 percent, for an average annual growth rate of 20.4 percent.

In analyzing the features of grain and cash crop production development in the past few years, we should include the following points:

1. We have primarily devoted ourselves to improving unit yields. Because China has a large population and little arable land, even reserve resources of arable land are limited. As population grows constantly larger, per capita land holdings will gradually decline. Consequently, if we are to improve gross yields for various crops we must try hard to improve productivity per unit of land area: this is the most important channel for our efforts. At the same time, we must also actively develop and utilize mountain lands, grasslands, and waters. Right now, because our economic resources are limited, it is difficult to develop and utilize our extensive hilly and mountainous lands, grasslands, and waters on a large scale. Nevertheless, from a long-term perspective, these areas still have major development potential.

2. Grain production and economic diversity must help each other forward. For a long time past, because the amount of grain per capita in China was always fairly short, we concentrated exclusively on grain. Not only did grain production grow slowly, but there was little room to maneuver in cash-crop production. In the past few years we have carried out a policy to "actively develop the diversified economy without any relaxation in grain production," and we have adopted a series of correct economic policies. Now we already have enough grain, and cash crops have also been developed comprehensively. After people's subsistence problems were essentially resolved a demand to improve food quality inevitably arose, calling for us to convert surplus grain by developing animal foods and other processed foods. This accelerated the growth of the diversified economy and advanced a new demand to restructure the rural economy.

3. For grain and cash crops we must adopt a production channel featuring comprehensive development and multi-stage utilization. In the past we engaged in one-crop production, and production options were narrow and limited, so the rural economy could not expand. In the past few years, since the output-related system of contracted responsibility was put into effect, we have implemented a production channel featuring comprehensive development and multi-stage utilization among many sectors, many avenues, and many links, built on a base of specialized households, specialized villages, and economic associations. This is the only way we can ensure that limited agricultural resources are fully utilized so that they increase in value many times over. It is also the only way we can make sure that our abundant labor resources are divided and constituted in an equitable fashion, that we open up all avenues for talented people, and that we build a flourishing rural economy.

4. To improve output we must possess suitable material technological equipment. Various large-scale production experiences and typical surveys indicate that if we want to improve yield levels for grain and cash crops, we

must have a corresponding level of material and energy as a foundation. Moreover, we must possess corresponding production technology and management techniques and improve our results from material technological equipment. This will guarantee normal operation in the overall production system and thus bring about a corresponding increase in productive forces.

B. An Analysis of Grain and Cash Crop Development Trends

1. The Trend of Development in Grain Crop Output Per Unit of Area

a. The Rate of Increase in Unit Yields

A look at the historical situation shows that in the 34 years from 1949 to 1983 the unit grain yield rose an average 9.3 jin per year. Within this, it rose an average 13.0 jin per year in the 3 years from 1949 to 1952, 6.2 jin per year in the 26 years from 1953 to 1978 (except for 10 years in which production fluctuated, in the other 16 years the average increase measured 10.1 jin per year), and 23.2 jin per year in the 5 years from 1978 to 1983 (see Table 8). From this it is obvious that it is possible hereafter to accomplish an average annual increase of 10 jin per mu, that is to move forward at a yearly rate of 2.4 percent. In this way it is possible for us to reach an average per-mu grain yield of approximately 600 jin nationwide before the year 2000.

Table 8. Increases in Unit Grain Yield Over the Years

Year	Unit yield (in jin)	Annual increase in jin within interval	
1949	137	1949-1952	13.0
1952	176	1953-1978	6.2
1978	337	1978-1983	23.2
1983	453	1949-1983	9.3

b. Conditions and Growth Rates on High-yield Land

In the past few years, calculated based on cultivated land area, the average per-mu grain yield in southern China in Jiangsu, Zhejiang, Shanghai, and Hunan has measured 580 to 660 jin. It generally took 13 to 18 years for these regions to rise to this level from around 365 jin per mu (which was the average national per-mu grain yield in 1980). If we calculate based on the 1982 average national per-mu grain yield of 416 jin, it took about 12 years for these regions to build up to the current level. In 1982 the basic production conditions in these four regions were as follows: figuring based on sown area, farmers applied 66 to 108 jin per mu of standard fertilizer (176 jin in Shanghai), the effective irrigated area reached 70 to 80 percent (of which 70 to 80 percent was paddy land), agricultural machine power measured 18.7 to 31.3 horsepower per 100 mu of arable land (58 horsepower in Shanghai), farmers reared 0.29 to 0.51 head of pigs per mu, and green manure crops accounted for 6.3 to 18.5 percent of the sown area. In the north, in Hebai, Shandong, Henan, and Liaoning, there are 20 or so high-yield counties. Within the space of 10 years the per-mu grain yield in these areas rose from about 360 jin to 570 jin or more. Their basic conditions were as follows: farmers

applied 100 or more jin per mu of fertilizer, the effective irrigated area reached 45 to 50 percent, agricultural machine power measured about 20 horsepower per 100 mu of arable land, and farmers reared 0.43 head of pigs per mu. If basic agricultural production conditions nationwide can all be brought to the level enjoyed in the above provinces, cities, and counties, there is a possibility that we may achieve a yield level of 570 to 660 jin per mu.

c. Production Capacities in Different Types of Regions

Based on statistical data on yields in the 2,137 counties in China from 1978 to 1980, we classified the data to calculate pooled results: On 508 million mu of sown area in high-yield regions the average per-mu yield reached 595 jin; on 487 million mu of sown area in moderate-yield regions the average per-mu yield was 421 jin; on 751 million mu of sown area in low-yield regions the average per-mu yield was 166 jin. Calculating from base figures of average output between 1978 and 1980, if we raise the average output level in low-yield regions to the level attained in moderate-yield regions, raise the output of moderate-yield regions to the level of high-yield regions, and further raise the output in high-yield regions to an average of 760 jin per mu, by the year 2000 the national average per-mu yield will reach 567 jin, up 7.9 to 12.1 jin per mu from the average yield between 1978 and 1980. This is essentially identical with results obtained through other avenues of reckoning.

Furthermore, from the perspective of the high-yield capacity we have already attained, several high-yield counties have appeared in the past few years in all different types of regions. Figured based on sown area, the average per-mu yield in these areas is around 800 jin, more than 100 percent higher than the 1978 to 1982 national average of 373 jin per mu. Right now these high-yield counties do not account for a large proportion of counties, but they reflect the actual production capacity that can be attained in different types of areas. If, by the year 2000, the average national per-mu yield increases to about 600 jin, it will only be 75 percent of the current average yield level in these high-yield counties.

d. The Relationship of Production Conditions and Technological Level to Unit Yield Level

Based on experimental research data on various crop yields, we plotted trends of change for each technological factor affecting output and then comprehensively analyzed and calculated the effectiveness of each factor in increasing yields. Among these are the following: each jin of fertilizer increases the grain yield 1 jin; after dry fields are converted to wet fields, each mu of irrigated land produces 37 to 100 percent more than dry land; switching to improved varieties increases the per-mu yield 10 percent; draining flooded land and transforming low-yield fields increases per-mu yields 50 percent; controlling blight and pest damage decreases output losses 3 percent; adopting greenhouse cultivation increases per-mu yields 10 to 20 percent; integrated cultivation techniques increase yields about 15 percent; and the benefits produced by agricultural mechanization through various measures were not separately calculated. Based on the effectiveness of the above measures in increaseing yields, we conducted a comprehensive analysis of

the degree of development it is possible to reach, and calculated that it is possible for grain output to increase from the current 365 jin per mu to around 610 jin per mu.

2. The Trend of Development in Cash Crop Output Per Unit of Area

In the period from 1950 to 1983 the per-mu yields of cotton, oil crops, sugar crops, fiber crops, and tobacco increased by average annual values of 2.4 jin, 2.2 jin, 33.6 jin, 9.0 jin, and 4.4 jin, respectively. During this time, the unit yield levels of oil and sugar crops fluctuated for 20-plus years and those of cotton, fiber crops, and tobacco fluctuated for 10-plus years. From 1978 to 1983 there were rapid increases in each of these crops: cotton, oil crops, sugar crops, fiber crops, and tobacco increased by average annual values of 8.6 jin, 11.2 jin, 243 jin, 37.6 jin, and 7.8 jin, respectively. They far surpassed the average rate of increase for the previous 33 years.

Right now there are some provinces and cities, such as Zhejiang, Shanghai, Jiangsu, Hunan, Guangdong, Fujian, and so forth, where the per-mu yields of cotton, oil crops, sugar crops, fiber crops, and tobacco have risen from 70 jin, 130 jin, 4,000 jin, 290 jin, and 240 jin, respectively, to 100 to 120 jin for cotton, 250 jin for oil crops, 6,000 jin for sugar, 650 jin for fiber crops, and 350 jin for tobacco. Ten or more years were spent in arriving at these yield levels. Particularly for cotton, in Jiangsu, Shanghai, and Zhejiang, and recently in some regions of Hebei and Shandong, the per-mu yield has been raised from 100 jin to 120 jin in just a few years, or even in a single year. Some high-yield counties with even higher production levels have also emerged in China, recording per-mu outputs of 150-plus jin of cotton, 300-plus jin of rape, 10,000-plus jin of sugarcane, 5,000-plus jin of beets, and 350-plus jin of flue-cured tobacco. This demonstrates that significant production potential remains for these major cash crops. Synthesizing and analyzing the large quantity of representative data, if we continue to develop at the average rate of increase recorded for 1950 to 1983, by the end of this century it is possible that average per-mu outputs of cotton, oil crops, sugar crops, fiber crops, and tobacco will reach 120 jin, 250 jin, 6,000 jin, 450 jin, and 350 jin, respectively.

3. The Trend of Development in Arable Land Area and Sown Land Area

According to figures published by the State Statistical Bureau, in 1949 there were 1.47 billion mu of arable land area in China. Due to wasteland reclamation during the 1950's, by 1957 arable land area had climbed to 1.67 billion mu. Thereafter the quantity decreased gradually until it dropped again to 1.47 billion mu in 1983. In the 26 years from 1959 to 1983 arable land declined an average of approximately 7.60 million mu per year. Data supplied from various areas indicates that in the future we must adopt strict measures to control the occupation of arable land for other uses and make sure that no more than an average 5 million mu per year are so occupied. In this way, by the end of the century our actual arable land area will also decline 100 million or so. We must reclaim 100 million mu of wasteland suitable for farming in order to achieve a balance between increases and declines: this is the only way we can essentially preserve the existing arable land area. It will be quite difficult to achieve this aim. In view of this situation, there

are two possible ways of estimating the trend of expansion in sown land area. By one method the sown area will decrease somewhat. While the area of arable land gradually declines 100 million mu, we will restore the multiple crop index to 155 percent of what it was in 1977. Thus, the actual sown area will drop 40 million mu, to 2.12 billion mu, and the portion of this sown in grain crops will decline to 1.64 billion mu, down approximately 100 million mu from the current level. By contrast, the area sown in cash crops and other crops will increase more than 30 million mu. By the second method of estimation, the sown land area will increase somewhat and the portion sown in grain crops will remain basically stable. We will strictly control the occupation of arable land for other uses, and at the same time we will restore the multiple crop index to 155 percent of what it was in 1977. Thus, the sown area may reach 2.3 billion mu, and the portion of this sown in grain crops will stabilize at the 1983 level of 1.71 billion mu. The area sown in cash crops and other crops will be further expanded by 100 million mu. However, we must still take into consideration that slope land of 25 degrees and above should be withdrawn from cultivation. It will not be easy to achieve the above arrangements.

C. Development Forecast for Various Gross Crop Yields in 1990 and 2000

Agricultural production is limited by natural and economic laws. To come up with a long-term development forecast we must possess a large quantity of data and have complete scientific demonstrations. Right now our foundation in this area is extremely weak. We have worked out a development forecast for various gross crop yields based only on an analysis of existing data and development trends for grain and cash crop unit yields and sown land areas. We have also made the following series of factors the basis for considering problems: 1) We must make the fullest and most rational use of existing arable land and improve various crop yields per unit of area. 2) Our national resources and potential are limited and we cannot invest a large quantity of money within the short term. In the future we must open up and utilize mountain land, grasslands, and water areas on a large scale. 3) Our standard of living is constantly improving and the demand for social development is constantly increasing. We must be basically self-sufficient in grain and other agricultural products, and we must do all we can to expand the quantity of agricultural exports. 4) We must make a complete appraisal of the role that specialized households, economic associations, and the production responsibility system based on household contracting will play in promoting the development of agricultural production. 5) We must rely on scientific and technological progress and extend applications of the benefits and potentialities that accrue after scientific and technical achievements are transformed into productive forces.

1. Output Levels for Various Crops

Based on developmental research on 28 crops, we gone one step further and conducted a comprehensive equilibrium analysis and demonstration on assorted crop yields and growing areas and induced the gross yield development level that may be reached by the years 1990 and 2000.

a. Grain Crops

We have proposed two plans for 1990: In Plan 1 the area sown in grain crops will stabilize at the 1983 level of 1.71 billion mu, the soybean area will be suitably restored, the average per-mu grain yield will reach 521 jin, and gross output will total 890.9 billion jin. In Plan 2 the pace of reduction seen from 1980 to 1983 will continue to develop, the area sown in grain crops will drop to 1.68 billion mu; the potato, sorghum, and variety grain crop areas will be suitably reduced; the average per-mu grain yield will rise to 523 jin; and gross output will total 879.3 billion jin. This plan will be regulated primarily by reducing crop areas and improving unit yields (see Table 9).

We have proposed three plans for 2000. In Plan 1 the area sown in grain crops will stabilize at the 1983 level of 1.71 billion mu, the average per-mu yield will reach 577 jin (up 54 to 56 jin over 1990), and gross output will total 985.9 billion jin. In Plan 2 the sown grain area will also be maintained at 1.71 billion mu, the average per-mu yield will rise to 616 jin (up 93 to 95 jin over 1990), and gross output will total 1,053.7 billion jin. In Plan 3, the sown grain area will be reduced to 1.64 billion mu (down 110 million mu from 1980), the average per-mu yield will rise to 618 jin (up 95 to 97 jin over 1990), and gross output will total 1,013.7 billion jin. From an overall perspective, Plans 1 and 2 both call for the area sown in grain crops to stabilize at the 1983 level of 1.71 billion mu. This requires us to adopt strict controls on arable land and bring the multiple crop index up to 155

Table 9. Grain Crop Development Plans (in billion mu, jin, and billion jin)

	Present situation					
	Average 1978-1982			1983		
Crop	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Total	1.756	373	654.4	1.711	453	774.6
Rice	0.506	574	290.3	0.497	680	337.8
Wheat	0.432	278	119.9	0.436	374	162.8
Corn	0.295	404	119.2	0.282	483	136.4
Potatoes	0.156	364	56.6	0.141	415	58.5
Millet	0.064	201	12.2	0.061	246	15.1
Sorghum	0.044	326	14.4	0.041	411	16.7
Soybeans	0.114	145	16.5	0.114	172	19.5
Variety Grains	0.149	189	28.3	0.139	200	27.8

	1990					
		Plan 1			Plan 2	
Crop	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Total	1.710	521	890.9	1.680	523	879.3
Rice	0.500	750	375.0	0.500	750	375.0
Wheat	0.420	430	180.6	0.400	430	172.0
Corn	0.300	580	174.0	0.300	580	174.0
Potatoes	0.120	500	60.0	0.120	500	60.0

Millet	0.060	300	18.0	0.050	300	15.0
Sorghum	0.040	500	20.0	0.040	500	20.0
Soybeans	0.140	220	30.8	0.140	220	30.8
Variety Grains	0.130	250	32.5	0.130	250	32.5

2000

Crop	Plan 1			Plan 2			Plan 3		
	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Total	1.710	577	985.9	1.710	616	1,053.7	1.640	618	1,013.7
Rice	0.500	800	400.0	0.500	850	425.0	0.480	850	408.0
Wheat	0.420	480	201.6	0.420	500	210.0	0.400	500	200.0
Corn	0.300	650	195.0	0.300	700	210.0	0.300	700	210.0
Potatoes	0.120	600	72.0	0.120	670	80.4	0.110	670	73.7
Millet	0.050	300	15.0	0.050	350	17.5	0.050	350	17.5
Sorghum	0.040	550	22.0	0.040	600	24.0	0.040	600	24.0
Soybeans	0.150	275	41.3	0.150	275	41.3	0.140	275	38.5
Variety Grains	0.130	300	39.0	0.130	350	45.5	0.120	350	42.0

percent of what it was in 1977; only then can we achieve our goal. In Plan 3, after the sown land area is reduced there will be a rather high demand on unit yield that will depend for success on significant material inputs and scientific and technological progress. Although these three plans all present some degree of difficulty, through strenuous efforts they are attainable.

b. Cash Crops

We have proposed two plans for 1990, calling for the area sown in cash crops to expand to 324 million or 298 million mu, respectively. The major increases will be in oil crops, peanuts, sunflowers, and beets.

The cotton growing area will be held to either 85 million or 80 million mu, down 6.16 million or 11.14 million mu from 1983. The average per-mu yield will be 110 jin and gross output will measure either 93.50 million or 88.00 million dan. If we improve quality and open up new markets there will still be the potential to increase production.

The oil crop growing area will be expanded to either 181.00 million or 161.00 million mu. Of this, rape will be expanded 25.00 million or 15.00 million mu over 1983, the average per-mu crop yield will be raised to 180 jin or 200 jin, and gross output will measure 144.00 million or 140.00 million dan, respectively.

The sugar crop growing area will be expanded to either 23.00 million or 19.30 million mu. The beet growing area in particular will be increased, by 4.84 million or 1.84 million mu, respectively, over 1983, the average per-mu yield will rise to either 2,500 jin or 3,000 jin, and gross output will measure 325.00 million or 300.00 million dan in Plans 1 and 2 respectively.

In fiber crops, the areas sown in jute and ambari hemp were reduced significantly in 1983 and gross output dropped somewhat. The sown area will

be restored in 1990 and the average per-mu yield will improve slightly, so gross output will rise to 30.50 million under Plan 1 or 24.40 million dan under Plan 2.

In tobacco, we will essentially preserve the current sown area of 8 million-plus mu. The average per-mu yield will reach 300 jin and gross output will measure either 27.60 million or 24.00 million mu.

We have proposed three plans for the year 2000. In Plan 1 the area sown in cash crops will be expanded to 351 million mu, and in particular oil crops, beets, and sugarcane will continue increasing. In Plan 2 the area sown will be 322 million mu, nearly the same as called for in Plan 1 for 1990. In Plan 3 the area sown will be reduced to 279 million mu, essentially maintaining the 1983 level. The components of these plans are as follows:

The cotton growing area will be maintained at the 1990 level and the average per-mu yield will rise to 115 jin, 120 jin, or 125 jin in Plans 1, 2, and 3 respectively. Gross output will reach 97.75 million, 102.00 million, or 100.00 million dan. Based on current circumstances, this can essentially meet social demand.

Under Plan 1 the oil crop growing area will measure 197.00 million mu; under Plans 2 and 3 it will measure 175.00 million and 144.00 million mu, respectively. Building on the 1990 base level, per-mu yields will reach either 221 jin, 233 jin, or 275 jin, and gross yield will measure either 436.00 million, 408.00 million, or 407.00 million dan, respectively. Figured at the 1982 oil conversion rate, the national average per capita holdings of edible vegetable oil may reach 13.1 jin, 12.3 jin, or 12.2 jin, respectively, in these three plans.

Under Plans 1 and 2 the sugar crop growing area will increase, expanding to either 30.00 million or 28.00 million mu, respectively, and the emphasis will continue to be on increasing beet growing area. By contrast, under Plan 3 the sugar crop growing area will be decreased to 22.00 million mu. Under these three plans the average per-mu yield for all sugar crops will reach either 6,100 jin, 6,143 jin, or 7,045 jin, and gross output will total 1,830.00 million, 1,720.00 million, or 1,500.00 million dan. This way, the average per capita sugar holdings will be 13.5 jin, 12.7 jin, or 11.4 jin. Under Plans 1 and 2 the sugar demand will be basically satisfied, but under Plan 3 we will continue to require a suitable quantity of imports.

The fiber crop growing area will be 10.00 to 12.00 million mu, slightly more than in 1990, and the average per-mu yield will not increase much. We will make appropriate adjustments in fiber crop composition: considering developments in ramie processing techniques, it is possible that we will suitably increase the proportion of ramie.

The tobacco growing area and per-mu yield will basically be maintained at 1990 levels, and the emphasis will be on improving quality. Gross yield will measure 27.30 to 31.02 million dan.

Because grain crops have expanded significantly in the past few years, the contradictory land competition between grain and cash crops has been alleviated. Hereafter, expansion of cash crop growing areas and gross yields will depend to a very large extent on commodity markets. In the three plans proposed here the cash crop growing areas are arrangeable and, with hard work, the unit yield levels are attainable (see Table 10).

c. Other Field Crops

We have proposed two plans for 1990. In Plan 1 the area sown in other field crops will be expanded to 238 million mu. This will primarily mean an increase of 36.00 million mu in green manure and fodder crops, to a total of 177 million mu. Vegetable growing area, on the other hand, will be constricted slightly to 50.00 million mu. In Plan 2 the area sown in other field crops will measure 218 million mu: green manure and fodder crops will total 157 million mu and vegetable crops will be further constricted to 47.00 million mu. Vegetables are primarily grown under intensive cultivation, and increasing gross output depends upon increasing unit yield.

We have proposed 3 plans for the year 2000. In these three plans the area sown in other field crops will be 244 million, 238 million, or 230 million mu, respectively. In Plans 1 and 2 the green manure and fodder crop area will be

maintained at 178 million mu and the vegetable growing area will measure 60 million or 50 million mu, respectively. In Plan 3 the area sown in green

Table 10. Cash Crop Development Plans (in million mu, jin, and million dan)

Crop	Present situation Average 1978-1982 Sown area	Per-mu yield	Gross output	1983 Sown area	Per-mu yield	Gross output
Cash crop total	244.45			266.41		
Cotton	75.93	72	54.59	91.16	102	92.74
Oil crops	119.04	139	165.47	125.85	168	211.00
Including:						
Rape	48.34	136	65.50	55.04	156	85.74
Peanuts	33.21	199	66.17	33.01	239	79.01
Sesame	12.12	61	7.40	11.84	59	6.97
Sunflowers	10.16	163	16.58	10.99	244	26.81
Huma	11.14	66	7.37	9.63	69	6.66
Sugar Crops	14.22	4,421	628.67	17.97	4,488	806.46
Including:						
Sugarcane	8.23	6,415	527.93	9.81	6,348	622.82
Beets	5.99	1,682	100.74	8.16	2,251	183.64
Fiber crops	9.50	286	27.14	5.84	428	25.00
Including:						
Jute, ambari hemp	4.92	455	22.38	3.41	599	20.38
Ramie	.75	111	.83			
Flax	1.02	287	2.93			
Leaf tobacco	11.43	223	25.47	11.52	240	27.65
Including:						
Flue-cured tobacco	8.98	254	22.81	8.58	268	22.99
Other cash crops	14.33			12.09		

Crop	1990 Plan 1 Sown area	Per-mu yield	Gross output	Plan 2 Sown area	Per-mu yield	Gross output
Cash crop total	324.30			298.20		
Cotton	85.00	110	93.50	80.00	110	88.00
Oil crops	181.00	185	335.00	161.00	199	321.00
Including:						
Rape	80.00	180	144.00	70.00	200	140.00
Peanuts	42.00	250	105.00	40.00	250	100.00
Sesame	14.00	80	11.20	12.00	100	12.00
Sunflowers	25.00	250	62.50	20.00	250	50.00
Huma	11.00	75	8.25	10.50	75	7.88
Sugar Crops	23.00	4,674	1,075.00	19.30	5,409	1,044.00
Including:						
Sugarcane	10.00	7,500	750.00	9.30	8,000	744.00
Beets	13.00	2,500	325.00	10.00	3,000	300.00
Fiber crops	9.00	430	38.70	8.00	430	34.40
Including:						
Jute, ambari hemp	5.00	610	30.50	4.00	610	24.40

Table 10 (continued)

Ramie	1.00	140	1.40	.80	140	1.12
Flax	1.50	75	1.13	1.50	75	1.13
Leaf tobacco	12.00	300	36.00	8.90	300	26.70
Including:						
Flue-cured tobacco	9.20	300	27.60	8.00	300	24.00
Other cash crops	14.50			14.50		

2000

Crop	Plan 1			Plan 2			Plan 3		
	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Cash crop total	350.50			322.00			279.10		
Cotton	85.00	115	97.75	85.00	120	102.00	80.00	125	100.00
Oil crops	197.00	221	436.00	175.00	233	408.00	144.00	275	407.00
Including:									
Rape	90.00	250	225.00	80.00	250	200.00	60.00	300	130.00
Peanuts	45.00	270	121.50	40.00	300	120.00	40.00	350	140.00
Sesame	14.00	110	15.40	12.00	120	14.40	12.00	140	16.80
Sun-flowers	25.00	250	62.50	20.00	250	50.00	15.00	300	45.00
Huma	12.00	80	9.60	11.00	90	9.90	10.00	100	10.00
Sugar crops	30.00	6,100	1,830.00	28.00	6,143	1,720.00	22.00	7,045	1,550.00
Including:									
Sugar-cane	12.00	10,000	1,200.00	10.00	10,000	1,000.00	9.00	10,000	900.00
Beets	18.00	3,500	630.00	18.00	4,000	720.00	13.00	5,000	650.00
Fiber crops	12.00	440	52.80	11.00	450	49.50	10.00	450	45.00
Including:									
Jute, ambari hemp	5.00	650	32.50	5.00	650	32.50	4.70	700	32.90
Ramie	1.20	160	1.92	1.00	180	1.80	.80	200	1.60
Flax	2.40	110	2.64	2.00	110	2.20	1.40	120	1.68
Leaf tobacco	12.00	330	39.60	8.60	330	28.38	8.60	330	28.38
Including:									
Flue-cured tobacco	9.40	330	31.02	7.80	350	27.30	7.80	350	27.30
Other cash crops	14.50			14.50			14.50		

manure and fodder crops will total 173 million mu and the vegetable growing area will be maintained at 50 million mu (see Table 11).

d. Fruit Trees, Tea, Silkworm Cocoons, and Rubber

China has a vast area of hilly and mountainous land that can be used to develop diverse economic forests. There is also a very great potential here for using unplowed land resources to produce various foods or daily necessities. The pace at which growing area and output for these kinds of crops develops is primarily restricted by social and economic conditions and the level of consumer demand. Historically speaking, these kinds of products have developed quite rapidly: in the 30 years from 1950 to 1980 gross orchard output increased 4.2-fold, expanding at an average rate of 5.6 percent per year; gross tea output increased 3.7-fold, expanding at an average rate of 5.3 percent per year; the gross output of silkworm cocoons increased 9.4-fold,

Table 11. Other Field Crop Development Plans (in million mu, jin, and billion jin)

	Present situation					
	Average 1978-1982			1983		
Crop	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Other field crop total	203.65			182.78		
Green manure	114.11	2,000	228.2	85.21		
Fodder crops	26.55					
Vegetables	51.17	3,163*	161.9	61.53		

	1990					
	Plan 1			Plan 2		
Crop	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Other field crop total	238.00			218.00		
Green manure	150.00	2,500	375.0	130.00	2,500	32.50
Fodder crops	27.00			27.00		
Vegetables	50.00	4,000	200.0	47.00	5,000	23.50

	2000								
	Plan 1			Plan 2			Plan 3		
Crop	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output	Sown area	Per-mu yield	Gross output
Other field crop total	244.00			238.00			230.00		
Green manure	150.00	3,000	450.0	150.00	3,000	450.0	125.00	3,000	375.0
Fodder crops	28.00			28.00			48.00		
Vegetables	60.00	5,000	300.0	50.00	6,000	300.0	50.00	6,000	300.0

(*1980 per-mu yield)

expanding at an average rate of 8.1 percent per year; and rubber developed even faster. However, up to now the average per capita holdings of products

of these crops have remained quite small and there is a need for further development.

Fruit: China has a prolific variety of fruit tree resources, as well as favorable natural conditions for developing orchard production. However, our current output is low and quality is poor. In 1980 the average per-mu yield was only 508 jin, and average per capita fruit holdings measured only 13.5 jin. According to the higher plan, by 1990 average per capita fruit holdings may reach 27.5 jin; according to the lower plan they may reach 23.5 jin. We have also proposed high and low plans for the year 2000: under the higher plan average per capita holdings may reach 56 jin and under the lower plan they may reach 40.3 jin. As we raise output we must also work hard to improve quality.

Tea: China has many famous specialty varieties of tea, and these are a major export commodity. In the past few years, due to quality and market problems, tea expansion has been greatly restricted. In view of this situation we have proposed two plans: one to maintain existing growing area and one to constrict growing area. Both plans rely on increasing unit yield to raise gross output. By 1990, under the higher plan average per capita tea holdings will measure 1.1 jin and under the lower plan they will total 0.9 jin; by 2000, under the higher plan they will measure 1.5 jin and under the lower plan they will total 1.4 jin. Quality will be somewhat improved in all cases.

Silkworm cocoons: In recent years silkworm cocoon production has grown rapidly, but, because quality has declined, problems with unsaleability have occurred. Taking into account the state of the domestic market and foreign trade demands, we have proposed one plan for 1990 that calls for a fairly slow increase in gross yield. For 2000 our high plan calls for growing area to expand 50 percent and gross yield to double over 1990, and our low plan calls for growing area to be maintained at the 1990 level and gross yield to increase by one-third. At that time average per capita holdings may reach 1.3 jin or 0.8 jin, respectively in these two plans, and quality will be distinctly improved.

Rubber: Although rubber production has grown rapidly in China we are still unable to meet demand and must import a large quantity each year. We should continue major development efforts. By 1990 our rubber growing area will be expanded to 7.50 million mu, the average per-mu yield will total 80 jin of dry rubber, and gross output may reach 300,000 tons; by 2000 the growing area will be further expanded to 8.50 million mu, the average per-mu yield will total 106 jin of dry rubber, and gross output may reach 450,000 tons.

A comprehensive survey of the future pace of development for these crops (see Table 12) shows that, except for silkworm cocoons, which will expand at a slower pace than in the past 30 years, all crops will exceed the pace of development sustained during the past 30 years. In the future the focus of development should be on raising unit yields, improving quality, and increasing the value of output. In addition, we must actively develop production of various kinds of medicinal materials and local specialty products, expand our markets, and increase exports.

2. Results of System Simulation Model and Regression Model Calculations

We have applied system theory principles to construct an organically integrated overall picture of grain and cash crop development and the factors affecting that development. We have observed and studied the dynamic relations, constructed a mathematical model of the interrelation of production function and composite function, combined calculations from multivariate regression and time series models, and conducted an overall simulation. After calculating per-mu yield according to production function and sown area according to composite function, we have sought gross output results for each crop, as follows: For 1990 we calculate 826.7 billion jin of grain, 94.05 million dan of cotton, 296.46 million dan of oil crops, 847.96 million dan of sugar crops, 24.96 million dan of jute and ambari hemp, and 21.49 million dan of tobacco; for 2000 we calculate 999.3 billion jin of grain, 112.50 million dan of cotton, 484.38 million dan of oil crops, 1,340.90 million dan of sugar crops, 30.28 million dan of jute and ambari hemp, and 25.06 million dan of tobacco. Except for sugar crops, which show a notably lower gross output in these calculations, gross outputs for all of these crops essentially coincide with the trends predicted above (see Table 13).

Table 12. Fruit, Tea, Silkworm Cocoons, and Rubber Development Plans (fruit, tea, and silkworm cocoons measured in million mu, jin, and million dan; rubber measured in million mu, jin, and thousand tons)

	Present Situation Average 1980-82			1983		
Crop	Area	Per-mu	Gross	Area	Per-mu	Gross
Fruit	26.74	508	135.85	30.22	628	189.74
Tea	15.61	39	6.07	16.57	48	8.01
Silkworm Cocoons	4.31	116	5.00	5.82	92	6.80
Rubber	4.83	43	103	7.12	48	172

	1990			2000		
Crop	Area	Per-mu	Gross	Area	Per-mu	Gross
Fruit	(1) 38.90	677	263.20	50.25	959	484.40
	(2) 42.88	718	308.00	56.59	1,188	672.00
Tea	(1) 16.00	76	12.17	16.00	102	16.36
	(2) 13.00	80	10.37	13.00	136	17.71
Silkworm Cocoons	5.00	150	7.50	(1) 5.00	200	10.00
				(2) 7.50	200	15.00
Rubber	7.50	80	300	8.50	106	450

Note: (1) represents Plan 1, (2) represents Plan 2

Table 13. Results of System Simulation Model Calculations (area in million mu, per-mu yield in jin, gross output in billion jin (for grain) and million dan (for all others))

Crop	1990	2000

	Sown	Per-mu	Gross	Sown	Per-mu	Gross
Grain	172.40	479	826.7	172.00	581	999.3
Cotton	95.00	99	94.05	90.00	125	112.50
Oil crops	162.00	183	296.46	234.00	207	484.38
Sugar crops	17.00	4,988	847.96	23.00	5,830	1,340.90
Jute, ambari hemp	4.00	624	24.96	4.00	757	30.28
Flue-cured tobacco	7.00	307	21.49	7.00	358	25.06

In the regression model analysis, we took the nine factors directly affecting output formation, applied a total of 24 years of statistical data for the years 1952 to 1958 and 1964 to 1980, and calculated a multivariate regression equation:

$$Y = 306.53 + 0.13965x_1 + 0.27595x_3 + 5.4739x_4$$

$$+ 0.0387x_5 + 94.1495x_6 - 0.2866x_7 - 0.2745x_8 + 0.01422x_9$$

For the year 2000 the forecasted values for these nine factors are as follows: 24 million tons of chemical fertilizer (active components), 27 million tons of organic fertilizer, 870 million mu of effective irrigation, 32.0 billion yuan of expenditures, 350 million HP of total agricultural machine power, 200 million mu of flood and drought disaster area, 1 to 2 variety replacements, and 1.74 billion mu of stable sown land area. Through the model analysis we arrived at a gross grain output of 994.8 billion jin, with an error of +/- 30 billion jin; that is, between 964.8 and 1,024.8 billion jin. This figure essentially coincides with the gross grain output forecasted above.

D. Production Composition In the Planting Industry

Establishing a reasonable composition in agricultural production is essential for making the best use of natural agricultural resources and promoting coordinated development among grain, cash crops, and other industries.

1. Analysis of the Components of Sown Area

As far as the arrangement of grain, cash crop, and other crop area is concerned, the three must have a certain coordinated relationship. In historical perspective, from 1952 to 1963 the grain crop per-mu yield fluctuated below 200 jin and grain crops occupied 84.8 to 87.9 percent of the total sown area, while cash crops occupied 6.3 to 9.2 percent and other crops accounted for 3.3 to 7.0 percent (figures here and below exclude 1958 to 1960). Between 1964 and 1973 the per-mu grain yield rose to under 300 jin and grain crops occupied 81.2 to 85 percent of the sown area, while cash crops accounted for 8.1 to 8.6 percent and other crops covered 6.6 to 9.8 percent of the sown area. Between 1974 and 1978 the per-mu grain yield rose to under 350 jin and grain crops occupied 80.3 to 81.4 percent of the sown area, while cash crops accounted for 8.7 to 9.6 percent and other crops covered 8.7 to 9.6 percent of the sown area. Between 1979 and 1981 the per-mu grain yield rose to over 350 jin and grain crops occupied 78.3 to 80.3 percent of the sown area, while cash crops accounted for 10 to 13 percent and other crops covered 8.6 to 9.7 percent of the sown area. From this it is obvious that as the unit grain yield increases the proportion of total sown area devoted to grain crops gradually decreases and it is possible for the proportions devoted to cash crops and other crops to rise correspondingly. Consequently, in 1990 and 2000 the proportion of total sown area devoted to grain crops will be 75.3 to 76.5 percent and 74.2 to 76.3 percent, respectively. The proportion devoted to cash crops will be 13.6 to 14.3 percent and 13.0 to 15.2 percent, respectively, and other crops will basically stabilize at a level of approximately 10 percent (see Table 14).

2. Gradually Establish a Planting Composition of Grain Crops, Fodder Crops, and Cash Crops

For a long time past, because per capita grain rations were scanty we were basically only able to maintain grain to support people; the proportion of fodder grain was very small and there were no special arrangements for fodder cropland. For the past two years we have reaped successive bumper harvests and per capita grain holdings have surpassed 700 jin, so the quantity of grain for livestock raising has increased. According to statistical data, in 1982

108.0 billion jin of fodder grain was used in livestock husbandry, approximately 17 percent of all grain consumed. In 1983 regional grain gluts appeared in many places, and, because grain varieties were unsuitable, in the south nearly 20.0 billion jin of rice was fed to pigs and there were also isolated northern places where wheat and other fine grains were fed to pigs. This is an extraordinarily uneconomical practice. Right now per capita grain holdings exceed 700 jin and we have succeeded in becoming more than self-sufficient in grain. Under these circumstances a new trend has appeared: there has been a transformation in grain crop production from self-support and direct utilization, which has long been the rule, to conversion and indirect utilization. Except for some grain that is converted into raw materials for the food industry, a considerable portion of it is converted to fodder grain. To adapt to this situation and improve economic benefits derived from grain and the entire planting industry, it is essential that we establish a planting composition of grain crops, fodder crops, and cash crops, inject fodder crops into the planting industry, and affix them a certain position in agriculture. In view of these considerations, we propose that we undertake gradual readjustments in the following areas:

Table 14. Plan for Components of Sown Area (in billion mu; percentages in parentheses)

Item	Present situation		1990		2000		
	1978-1982 average	1983	Plan 1	Plan 2	Plan 1	Plan 2	Plan 3
Total sown area	22.04 (100)	21.60 (100)	22.72 (100)	21.96 (100)	23.04 (100)	22.70 (100)	21.49 (100)
Including:							
Grain crops	17.56 (79.7)	17.11 (79.2)	17.10 (75.3)	16.80 (76.5)	17.10 (74.2)	17.10 (75.3)	16.40 (76.3)
Cash crops	2.44 (11.1)	2.66 (12.3)	3.24 (14.3)	2.98 (13.6)	3.50 (15.2)	3.22 (14.2)	2.79 (13.0)
Other crops	2.04 (9.2)	1.83 (8.5)	2.38 (10.4)	2.18 (9.9)	2.44 (10.6)	2.38 (10.5)	2.30 (10.7)

First, in the southern paddy district we should suitably expand cultivation on 30.00 to 50.00 million mu of corn interplanted with soybeans or else grow high-yield fodder rice; in the North and Northeastern Regions we should suitably expand cultivation on 30.00 to 50.00 million mu of dry paddy (which requires only one-third of the water volume needed for wet paddy). This will both increase the supply of husked rice in the north and allow an increase of on-the-spot decisions in the south regarding fodder grain supplies. In addition, it will allow us to maintain an essential balance between output from paddy and corn areas.

Second, we should gradually switch one-tenth of the sown corn area, 27 to 30 million mu, over to cultivation of silage corn. This alone could be used to raise 3.00 million-plus head of dairy cattle and increase the per capita milk supply nationwide by 20 jin.

Third, on some corn and sorghum land we should institute soybean and other legume intercropping and interplanting and mow this by stages to expand the sources of protein fodder. If we intercrop or interplant soybeans on 50 percent of the sown corn and sorghum areas we can improve the soybean harvest by 8.5 billion jin and reap a large quantity of bean stalks, and we can also use the biological nitrogen-fixing function of legume crops to improve soil fertility.

Fourth, we should gradually expand green manure crops from the current 100 million mu to 150 million mu and handle them as we do agricultural grassland: as far as possible we should use them for fodder and then return the animal manure to the land. Thus we can both increase protein fodder and fertilize the land.

Fifth, we should use the 30 million mu or so of high-yield potato crops as fodder crops.

The above five suggestions plus the existing fodder crop area could bring the crop area used for growing fodder up to nearly 500 million mu. If we make these readjustments we will bring about a major transformation in production composition within the planting industry overall. That is, we will change from the current grain crop and cash crop composition (including vegetables and other crops) to one comprised of 1.4 billion mu of grain crops, 500 million mu of fodder crops, and 400 million mu of cash crops (including vegetables and other crops). Thus, grain crops, fodder crops, and cash crops will each be properly provided for. In the future we must use readjustment to establish gradually a new production composition in the planting industry--one in which agriculture and animal husbandry, and grain rations and fodder grain are integrated and there is comprehensive development of both grain production and the diversified economy.

3. Coordinate Grain and Cash Crop Development

For a long time the contradiction between grain and cash crops has been a prominent problem in Chinese agricultural production. The relationship between the two is determined primarily by two factors: the first is the level of grain production, or perhaps we can expand this to the level of food production overall; the second is the national income level, or perhaps we can constrict this to the level of people's consumption funds.

The contradiction between grain and cash crops is manifested primarily in conflicts over land, seasons, fertilizer, water, and labor, particularly focused on sown area. For a long time there has been very little surplus land available for making adjustments between grain and cash crop area. Historically, this situation developed as follows: 1) When national average per capita grain holdings have been 600 jin the people have just been able to make do, and at those times the sown cash crop area has generally accounted for about 9 percent of the total sown area (as from 1955 to 1958). 2) When average per capita grain holdings have been less than 500 jin the people have lived in straitened circumstances, and at those times the sown cash crop area has generally accounted for approximately 7 percent of the total sown area (as from 1961 to 1963). 3) When average per capita grain holdings have been

between 540 and 590 jin, the people have been hard pressed, and at those times the sown cash crop area has generally accounted for about 8 percent of the total sown area (as from 1964 to 1972). 4) When average per capita grain holdings have been from 640 to 680 jin the people have fared quite well, and at those times the sown cash crop area has generally accounted for 10 percent of the total sown area (as from 1979 to 1981).

Since the 3d Plenum of the 11th Central Committee we have put into effect a series of policies beneficial to developing agricultural production. From 1978 to 1981 the state imported about 80.00 billion jin of grain and reduced grain purchases from farmers. In addition, during that 3 years the combined grain production increment of 40.00 billion jin was left in the countryside and farm product procurement prices were increased. This last factor alone raised peasant income 40.00 to 50.00 billion yuan during that three year period. Because we adopted these policies the peasants were able to recuperate and build up their strength and the entire rural economy was envigorated. We reaped bumper harvests 2 years running in 1982 and 1983 and average per capita grain holdings surpassed 700 jin. The grain situation took an unprecedented turn for the better and cotton, oil crops, fiber crops, tobacco, and other cash crops even began to accumulate overstocks. At this time the proportion of total sown area devoted to grain crops dropped for the first time below 80 percent and the proportion devoted to cash crops rose for the first time above 10 percent. The facts show that after people's subsistence problems are basically resolved the major limiting factors on cash crop development are not grain production problems; rather they are market demand and the people's purchasing power and consumption level. Hereafter these will be a fundamental feature of cash crop development.

4. The Composition of Output Value in the Planting Industry

Grain crops have long represented the major proportion of output value in the planting industry; they have essentially maintained a 70 percent share. This disproportionate ratio reflects the fact that cash crops and various other crops have not developed correspondingly. In the past few years, because we have adopted measures to readjust production composition in the planting industry, this situation has gradually taken a turn for the better, but we still need to continue making readjustments. According to production forecasts for various crops and calculations based on 1980 fixed prices, the gross value of output in the planting industry will rise from 141.5 billion yuan in 1980 to 204.4 billion yuan in 1990 and 251.7 billion yuan in 2000. Of this, the proportion devoted to grain crops will drop from 72 percent in 1980 to 69 percent and then to 68 percent; the proportion devoted to cash crops will increase from 16 percent in 1980 to 19 percent and then to 20 percent; other crops will be basically maintained at a 12 percent level (see Table 15).

Table 15. Plan for Output Value Composition in the Planting Industry (in billion yuan)

Item	1980		1990		2000	
	Output value	%	Output value	%	Output value	%
Planting industry						

total	141.5	100	204.4	100	251.7	100
Grain crops	101.4	72	140.0	69	172.2	68
Cash crops	22.7	16	39.6	19	50.0	20
Other crops	17.4	12	24.8	12	29.5	12

In order to analyze changes in the proportion of gross agricultural output value contributed by the planting industry, as well as to look at the question of accumulation funds in agriculture itself, we have consulted output values, calculated by the relevant departments, for forestry, animal husbandry, and fishery in the years 1990 and 2000, added in rough calculations of industrial and sidelines output values for 1990 and 2000, and conducted a preliminary inquiry into statistical avenues for figuring the composition of output values in the quadrupled gross agricultural output value.

In the first calculation, gross agricultural output value includes team-run industries, and the proportion contributed by the planting industry will decline from 63.7 percent in 1980 to 46.0 percent in 1990 and 28.3 percent in 2000. The proportion contributed by forestry output value will increase from 4.3 percent in 1980 to 5.6 percent in 1990 and then drop to 4.5 percent in 2000. Animal husbandry will drop from 15.3 percent in 1980 to 14.6 percent in 1990 and then rise to 16.9 percent in 2000. Industrial and sidelines enterprises (including team-run industries) will rise from 15.1 percent in 1980 to 31.8 percent and then to 48.6 percent. The fishery share will not change significantly: in 1980 it was 1.7 percent, in 1990 it will be 2.0 percent, and in 2000 it will be kept to the 1.7 percent level.

In the second calculation, gross agricultural output value includes township and town enterprises, and the proportion contributed by the planting industry will drop from 56.0 percent in 1980 to 40.5 percent in 1990 and 24.9 percent in 2000. The forestry share will increase from 3.7 percent to 5.0 percent and then drop to 4.0 percent. Animal husbandry will decline from 13.5 percent to 12.9 percent and then increase to 14.9 percent. Sidelines will rise from 5.1 percent to 7.6 percent and then 7.7 percent. Fishery will increase from 1.5 percent to 1.8 percent and then return to 1.5 percent. Township and town enterprises will jump from 20.2 percent to 32.4 percent and then 47.1 percent.

In these two calculations of output value composition, although forestry, animal husbandry, and fishery output values will increase by a large margin, their proportional share of gross output value will not change much. However, the proportions contributed by township and town enterprise and team-run sidelines will shoot up until they comprise nearly 50 percent of gross output value in 2000. These changes in the composition of agricultural output value will induce a series of changes in the overall composition of rural productive forces and labor power, as well as in the structure of other industries. This is a feasible means of providing our own accumulation funds for agricultural production development.

E. Expand Food and Fodder Resources

1. Expand Food Resources

Based on an analysis of the above calculations of production capacities and growth rates for grain and other crops, by the end of this century China's food sources will still be primarily grain, vegetable oil, sugar, fruit, vegetables, and other food cash crops, and these will have grown by a fairly large margin. We have also accomplished a preliminary examination of other food sources.

a. Prospects for Developing Animal Foods

In recent years, because grain production has increased rapidly, animal foods have also developed rather quickly. In 1982 the average national per capita output of meat, milk, and eggs was 26.8 jin, 3.9 jin, and 5.6 jin, respectively, and fodder grain consumption rose to 108.0 billion jin. Based on estimates of different potential for fodder resources and different fodder conversion rates for livestock and animal feed, we have proposed two plans: in the wake of expanded grain production, by the year 2000 we estimate that we may be able to supply either 295.0 billion jin or 348.0 billion jin of fodder grain (see Table 16). Based on typical surveys of current grain and meat consumption, grain rations do not decrease distinctly until the average per capita consumption of meat, eggs, fish, and other animal products exceeds 100 jin. When average per capita meat consumption is 50 to 66 jin the amount of decrease in grain rations is limited. Particularly in rural areas, because the supply of other non-staple foods is rather small and living conditions are limited, it is still difficult to achieve balanced consumption. Consequently, when sales of meat, eggs, fish, and other animal products increase it is still possible for the grain ration to rise. In view of this situation we cannot depend on constricting grain rations to increase fodder grain. Rather, we must further develop feed sources and improve the rate of return on feed.

Table 16. Predictions of Animal Foods Output and Concentrated Feed Consumption in the Year 2000

	Animal foods output			
	Lower limit plan		Higher limit plan	
Animal product	Per capita average (jin)	Total (billion jin)	Per capita average (jin)	Total (billion jin)
Meat	48	57.6	60	71.95
Milk	48	57.6	50	60.0
Eggs	22.6	27.12	25	30.0

	Concentrated feed consumption (billion jin)	
Feed	Lower limit plan	Higher limit plan
Unprocessed food grain	295.0	348.0
Grain chaff	65.0	76.0
Dregs cakes	17.0	24.0
Total	377.0	448.0
Actual feed used (after deducting 21.0 billion jin of ordinary feed)	356.0	427.0

Right now 95 percent of China's meat products come from agricultural districts, and only about 4 percent (approximately 600 to 800 million jin) come from pastoral districts. China has 3.3 billion mu of grasslands that can be used, and they produce an average of less than 0.3 jin of meat per mu. By the end of this century it is entirely possible that we can increase grassland meat output 1- to 2-fold over the current level if we can construct 500 million mu of man-made grasslands and 500 million mu of corrals, open up 500 million mu of waterless grass farms, exterminate rodents on 700 million mu of land, and enhance scientific management on all sorts of grasslands to further improve grass output.. However, even if we do, we can only produce 1.6 to 2.4 billion jin of meat products, for an increase of no more than 1.3 to 2.0 jin per capita nationwide. This will still represent about 4 percent of the gross output of all meat products at that time.

As for the supply of aquatic products, China has a total of 280 million mu of freshwater area, of which 75 million mu can be used to breed aquatic products. We are now using only about 57 percent of this, and the average per-mu yield is only several tens of jin. We breed aquatic products on only 2.08 million mu of saltwater area, which is less than one-tenth of the total breeding area available to us. If only we persist in concentrating on breeding while also integrating breeding with fishing, by the year 2000 the gross output of aquatic products could rise from the current 5.00 million-plus tons to 311.00 million tons, thus meeting the average national demand of 18 jin per capita.

b. Production Potential for Ligneous Food and Oil Crops

China now cultivates ligneous edible oil crops on 85 million mu of land and annually produces approximately 100 million jin of oils and fats, of which tea-seed oil accounts for 80 percent (at only about 6 jin per mu). Ligneous food crops, primarily chestnuts, jujubes, and persimmons, are cultivated on 10.80 million mu of land and produce a total of approximately 1.9 billion jin per year. Based on national population, for many years now average per capita holdings amounted to 0.3 jin of ligneous oil products and 1.9 jin of ligneous food products. A considerable portion of this is marketed abroad and the amount we actually consume ourselves is still extremely small. We propose three plans forecasting development for the year 2000:

Plan 1: Gross output of ligneous oil crops (converted to oil) will be 1.63 billion jin, or 1.4 jin per capita. Gross output of ligneous food crops will be 3.66 bilion jin, or 3.1 jin per capita.

Plan 2: Gross output of ligneous oil crops (converted to oil) will be 2.31 billion jin, or 1.9 jin per capita. Gross output of ligneous food crops will be 6.00 bilion jin, or 5.0 jin per capita.

Plan 3: Gross output of ligneous oil crops (converted to oil) will be 2.31 billion jin, or 1.9 jin per capita. Gross output of ligneous food crops will be 15.50 bilion jin, or 12.9 jin per capita.

Of the above three plans, Plan 3 is the ideal plan based on production potential. If we adopt certain incentive policies, open marketing channels,

enhance scientific management, and increase some material inputs, it will be possible to accomplish this plan. Generally speaking, Plan 1 will be relatively easy to accomplish just by holding to present policies and conventional management. For ligneous food crops Plan 3 falls between the other two and will be attainable through strenuous efforts.

2. Expand Fodder Sources

Fodder resources in China are abundant and varied, but due to the effects of natural, technological, and economic conditions and other factors, there has been restricted development and utilization of many fodder resources. We project that by the end of the century fodder resources will still be dependent primarily on grain, chaff, dregs cakes, and straw (including legume crops). Of course, we will make significant progress in developing and utilizing northern grasslands and southern grassy mountain and slope land. We have explored methods of opening up fodder sources just from the following few angles, and we have also analyzed fodder resource development potential for the year 2000.

a. Concentrated Feed Resources

On a foundation of grain and cash crop development we must increase the quantities of unprocessed food grains, grain chaff, dregs cakes, and straw provided for fodder. By readjusting production composition in the planting industry we must actively expand legume crop cultivation. We must improve our utilization ratio by returning green manure and fodder straw to the land as animal manure. We must use breeding methods to increase the content of protein, lysine, and other nutritional components in fodder crops. We predict that by the year 2000 we will be able to use for fodder approximately 300.0 billion jin (about 30 percent) of the gross grain output of 985.0 to 1,053.7 billion jin (see Table 16), 65.0 to 76.0 billion jin (about 70 to 80 percent) of the gross grain chaff output of 100.0 billion jin, and 170 to 240 jin [figure as published] (about 50 to 70 percent) of the gross output of dregs cakes totalling 34.0 billion jin. In addition, we must integrate farming and animal husbandry and adopt reasonable crop rotation among farm crops and fodder and green manure crops. If we plan for 40.00 to 50.00 million mu of alfalfa we can harvest 16.0 to 20.0 billion jin of dried alfalfa (figured at a per-mu yield of 400 jin); if we plan for 150 million mu of green manure we can reap 105.0 billion jin of dried green manure stalks and leaves (figured at a per-mu yield of 700 jin). The two of these will combine to make 121.0 to 125.0 billion jin, with a nutritional value equivalent to 121.0 to 125.0 billion jin of concentrated feed.

b. Coarse Fodder Resources

Forage grass: By constructing man-made grass farms and other measures, by the end of this century we will bring the average per-mu yield in the north up to 250 to 400 jin of dried grass on the 600 million mu of rich grasslands, for a possible yield of 150.0 to 240.0 billion jin. On the 1.56 billion mu of arid grasslands the average per-mu output will measure 140 to 300 jin of dried grass, for a possible yield of 216.0 to 468.0 billion jin. On the 1.14 billion jin of desert grasslands the average per-mu yield will measure 50 to 150 jin of dried grass, for a possible yield of 57.0 to 171.0 billion jin. In the south, on the 700 million mu of usable grassy mountainsides and slopelands the average per-mu yield will total 650 to 800 jin of dried grass, for a possible yield of 460.0 to 560.0 billion jin. The above four sources combined may produce 883.0 to 1,430.0 billion jin of dried grass. If we figure on a 70 percent utilization ratio we will be able to provide 618.1 to 1,007.3 billion jin of dried grass for fodder.

Straw: Extrapolating from predictions of gross output for grain and other crops, by the end of the century we will be able to produce about 1,248.0 billion jin of grain straw, 48.0 billion jin of oil-crop stalks, and 17.0 billion jin of sugar-crop stalks. A combination of these three totals 1,313.0 billion jin of straw and stalks. If we figure on a 60 to 65 percent utilization ratio, we may supply 787.8 to 853.5 billion jin of straw for fodder.

Based on the above calculations of dried grass and straw production, by the end of the century we will be able to supply approximately 1,405.9 to 1,860.8 billion jin of coarse fodder.

c) Green Fodder Resources

We must actively utilize water area to develop water hyacinths, water amaranths, water lettuce, and red and green duckweed. If we expand cultivation of green fodder crops, and their improve unit yields, based on 150 to 200 million mu of growing area these sources combined can provide 1.5 to 2.0 trillion jin of green fodder.

d) Other Fodder Resources

Avenues to opening other fodder resources: 1) Create the conditions for large-scale production of yeast, bacteria, algae, and other unicellular protein feeds; 2) Develop and utilize insects or other small animals such as earthworms, snails, and so forth as sources of protein feeds; 3) Dig up wild high-protein plant resources such as false indigo; 4) Utilize pieces leftover after processing animal products and produce animal-based feeds.

e. Production of Feed Additives

First we must bring production of fodder urea up to about 200,000 tons. Second, we must produce amino acids, trace elements, growth hormones, and so forth to improve the nutritional value of feed and increase the return from its use.

In order to develop and utilize various fodder resources to the fullest and improve our resource utilization ratio, we must correspondingly construct a feed production base, energetically develop the feed industry, and gradually establish a feed production system and a reasonable distribution and composition of feed production.

III. Measures We Must Adopt To Achieve Projected Growth Targets

Achieving the above projected growth targets not only depends on improving production conditions and making reasonable use of our various natural resource advantages, it also hinges on what economic, technological, and administrative and management measures we adopt.

A. Increase Material Inputs and Fashion a Corresponding Production Capacity

1. Chemical Fertilizer

According to relevant specialized research and projections of nutrient absorbtion for each crop based on the amount of fertilizer it requires, by the year 2000 we will need a total of roughly 139,271,000 tons of chemical fertilizer. Of this, we will need 71,215,000 tons of ammonium sulphate, 35,000,000 tons of superphosphate, and 33,056,000 tons of potassium sulphate. In addition, according to the results of mathematical model calculations of Chinese chemical fertilizer production which were conducted by the Land Fertility Institute of the Chinese Academy of Agricultural Sciences and the Applied Mathematics Institute of the Chinese Academy of Sciences, by the end of the century China will need a total of 120 to 150 million tons of chemical fertilizer. Second, we must stress scientific fertilizer application. If we

raise our fertilizer utilization ratio from the current level of less than 30 percent up to 40 percent, it will be equivalent to applying an extra 10.00 million tons or more of chemical fertilizer per year nationwide, and it will allow the peasants to save 2.0 billion yuan and increase grain output 30.0 billion-plus jin per year. Third, adopting measures combining chemical and organic fertilizers will further improve the varietal composition of fertilizer and gradually readjust the nitrogen, phosphorus, and potassium ratio from the current 1:0.25:0.002 to about 1:0.6:0.2, thus improving results. In addition, based on China's chemical fertilizer mineral sources and the current production capacity of chemical industry equipment, the chemical fertilizer industry has preliminary plans to attain production of approximately 120 million tons of standard fertilizer by the end of the century. This can only meet the lower limit of demand.

2. Irrigation

Since the founding of the PRC we have extended irrigation an average of over 15.00 million mu per year. However, irrigated land holdings in China amount to an average of only 0.83 mu per capita in the farming population, or about one-half of the average world level. Right now 295.00 million mu, about 58 percent, of China's high-yield land is irrigated; 222.00 million mu, about 45.5 percent, of our moderate-yield land is irrigated; and 171.00 million mu, about 22.8 percent, of our low-yield land is irrigated. In the future, in addition to continuing to enhance existing field irrigation conveyance systems and to improve results from irrigation water, we must also appropriately expand irrigated area as water source conditions permit. Because water source conditions differ, current irrigation water quotas may be as high as 1,100 cubic meters or as low as less than 400 cubic meters. Figured at an average water use of 660 cubic meters, if we want to achieve the above projected crop output targets we must seek to add 200 million mu of irrigated area to the existing irrigation base. Precipitation is distributed unevenly in China--more in the south and less in the north--and the average perennial precipitation nationwide (630 mm) is only 64.9 percent of the world average (970 mm). Because precipitation is scarce, and because it is concentrated largely in the summer, generally speaking we do not have an overabundance of water resources, so we must be even more careful in developing and using them. Our focus in developing irrigation facilities must continue to be on the North China Plain and the Northeast Plain. In these regions cultivated land is even and level, water conditions are convenient, and irrigation produces fairly high results. In the Southwest and Northwest Regions we must select places where water and electricity conditions are advantageous to expand irrigated area.

3. Agricultural Machinery

a. Based on various calculations--typical high-yield calculations for southern and northern regions, current typical examples of southern high-yield counties and cities and northern counties already producing yields of 560 jin or so per mu of sown land, agricultural machine power per 100 mu (11 to 19.4 HP in the south and about 20 HP in the north), and total cultivated land area (591,472,000 mu in the south and 899,007,000 mu in the north)--we will need a total of 245 to 295 million HP.

b. According to calculations of current farm machinery conditions on high-, moderate-, and low-yield land, in 1980 the nation averaged 24.76 HP per 100 mu of high-yield land, 17.86 HP per 100 mu of moderate-yield land, and 10.84 HP per 100 mu of low-yield land. If we extrapolate based on raising output on low-yield land up to the level of moderate-yield land, raising output on moderate-yield land up to the level of high-yield land, and raising output on high-yield land about 20 percent, by the year 2000 we will need 276 million HP of farm machinery.

Figuring from the above two methods, we will need to raise total farm machine power from 200 million HP in 1980 to 250 to 300 million HP by 2000. Our focus should be on replacing machinery and adopting complementary sets of equipment to improve utilization efficiency.

4. Rural Electricity Consumption

Calculating based on current electricity consumption on high-, moderate-, and low-yield lands, in 1980 China used an average of 16.86 billion kwh of electricity on high-yield land, 8.95 billion kwh on moderate-yield land, and 6.27 billion kwh on low-yield land. If we extrapolate based on raising electricity consumption on low-yield land up to the level of moderate-yield land, raising consumption on moderate-yield land up to the level of high-yield land, and raising consumption on high-yield land about 20 percent, rural electricity consumption will rise from 32.1 billion kwh in 1980 to over 46.0 billion kwh in 2000, for an average of over 30 kwh per mu of cultivated land.

5. Agricultural Pesticides and Agricultural Plastic Sheeting

According to projections in relevant special studies, demand for agricultural pesticides will rise from 193,000 tons in 1980 to 210,000 tons in 1990 and 2000. Within this, in 1990 the ratio of insecticides, germicides, and herbicides will be 8:1:1, and by 2000 this will gradually be adjusted to 6:2:2. The need for agricultural plastic sheeting will increase from 119,000 tons in 1980 to 560,000 tons in 1990 and about 700,000 tons in 2000.

We should point out that the natural process of agricultural production is a process of biological reproduction through energy conversion. The general trend is that the more energy is invested the more products will be produced. If there is no set energy investment there can be no set production outcome. By historical comparison, in 1952 China invested a total of 2.01 billion joule per mu of cultivated land (here and below, this includes labor, animal power, seed, organic fertilizer, machinery, fuel, electric power, chemical fertilizer, and agricultural pesticides) and harvested an average per-mu grain yield of 225 jin. In 1979 the energy investment totalled 4.28 joule per mu of cultivated land and we harvested an average per-mu grain yield of 570 jin. In 1979 energy conversion efficiency (the ratio of output energy to input energy) was 1.96, up more than 100 percent over 1952.

Based on 1978 to 1980 county statistical data we calculated average grain output for high-, moderate-, and low-yield land in different regions. In addition, based on on 1980 county statistical data we correspondingly

calculated fertilizer consumption per mu of cultivated land, the proportion of cultivated land under effective irrigation, farm machine power per 10,000 mu of cultivated land, and rural electrical consumption. The disparities in material inputs on high-, moderate-, and low-yield land are obvious. Looking at average national values, fertilizer consumption per mu of cultivated land measures 116.8 jin on high-yield land, 75.8 jin on moderate-yield land, and 51.6 jin on low-yield land; the proportion of cultivated land under effective irrigation is 19.8 percent on high-yield land, 14.9 percent on moderate-yield land, and 11.5 percent on low-yield land; farm machine horsepower available per 10,000 mu of cultivated land measures 1,827 HP on high-yield land, 1,375 HP on moderate-yield land, and 874 HP on low-yield land; and rural electricity consumption per mu of cultivated land totals 32.4 kwh on high-yield land, 20.1 kwh on moderate-yield land, and 12.9 kwh on low-yield land (see Table 17).

Table 17. State of Material Inputs on High-, Moderate-, and Low-yield Land

Regional Yield breakdown	Cultivated area and composition (million mu; %)	Grain yield per mu of cultivated land (jin)	Fertilizer use per mu of cultivated land (jin)	% of cultivated land under effective irrigation (%)	Machine power per 10,000 mu cultivated land (HP)	Electricity use per mu of cultivated land (kwh)
Northeast	248.949	345	42.2	13.0	899	19.3
high	31.9	437	60.8	7.7	1,217	32.6
moderate	22.8	372	40.7	3.2	942	22.9
low	45.3	225	25.1	2.1	701	9.4
North China	387.398	503	91.8	56.7	1,848	28.3
high	35.5	776	117.0	26.1	2,379	36.2
moderate	35.3	458	89.0	19.3	1,721	25.1
low	29.2	250	69.0	11.3	1,358	22.5
Northwest	262.723	286	12.0	29.2	610	7.2
high	23.8	441	21.1	13.2	1,187	13.1
moderate	35.5	306	10.2	10.5	570	5.6
low	40.7	178	8.2	5.5	308	3.3
Middle & Lower Chang Jiang	314.421	950	128.1	67.5	1,824	31.2
high	39.8	1,232	189.1	28.2	2,108	43.0
moderate	40.5	866	119.7	22.1	1,911	26.4
low	19.7	553	75.5	17.2	1,070	17.1
Southwest	170.181	596	79.5	38.7	911	12.8
high	25.5	959	117.4	14.5	1,201	17.7
moderate	31.1	666	73.5	13.8	905	13.8
low	43.3	333	47.6	10.4	744	9.2
South China	106.870	828	133.4	62.1	1,650	22.7
high	31.8	1,214	194.6	29.7	1,879	30.9
moderate	26.0	904	121.5	18.1	1,701	22.3
low	42.2	490	84.1	14.3	1,446	16.9

National average	1,489.578	567.0	81.2	46.2	1,346	21.5
high	31.3	850.4	116.6	19.8	1,827	32.4
moderate	31.9	571.8	75.8	14.9	1,375	20.1
low	36.8	297.0	51.6	11.5	874	12.9

All our experiences verify that natural conditions and production conditions are both deficient on low-yield land, so we must take major steps before we can achieve results. These include increasing a large number of material and energy inputs and improving fundamental production conditions. In moderate-yield regions, because they already possess a moderate productivity level, we need only provide suitable supplemental material and energy inputs to make it easier to obtain results. On high-yield land, on the other hand, because production conditions are already at a high level, the most important thing is to augment technological reforms, concentrate operations, and provide reasonable inputs; only then can we obtain stable high yields and improve economic results. In view of this situation, the direction of investment in the current phase should be focused on supporting moderate-yield regions to enable them to achieve their production potential rapidly. In low-yield regions we should transform the land as we use it and do a good job on early-stage work in order to develop and create favorable conditions. In high-yield regions we must "stabilize moderate yields and strive for high yields," further improve production conditions, and make new scientific and technological breakthroughs.

B. Rely on Scientific and Technological Progress and Transform Scientific and Technological Achievements into Productive Forces As Quickly As Possible

Relying on scientific and technological progress and accelerating technological transformation are our major means of realizing projected growth targets for each crop. For a rather long time to come the foci of scientific and technological work in the planting industry will be as follows: 1) We must integrate the superior traditional techniques of China's inherent intensive cultivation closely with modern biological science and technology. 2) We must vigorously expand existing scientific and technological achievements and constantly improve the output, quality, and commercial productivity of the major agricultural and sideline products. 3) We must import certain advanced foreign science and technology to be digested, transformed, absorbed, and utilized in the light of China's actual conditions. 4) We must adopt technical avenues featuring high yield, stable output, high quality, energy savings, and high efficiency, and we must accelerate the pace of technological transformation.

Now we must energetically disseminate and apply the following scientific and technological achievements:

1. Comprehensive cultivation techniques utilized in various regions to produce high, stable yields: This includes, for example, comprehensive drought, waterlogging, and alkali control techniques used in the Huang He-Huai He-Hai He region; waterlogging prevention and floodwater control cultivation techniques used on the middle and lower reaches of the Chang Jiang; the technique of constructing fertilizer mounds to increase yields in the dry

fields of the Loess Plateau region; comprehensive techniques to defend against low temperatures and cold damage in the northeastern region; and comprehensive techniques used to develop and utilize land in the red and yellow hill regions. If we conscientiously disseminate these measures during the Seventh 5-Year Plan we can increase yields by 10 percent or more on every mu of land. If we disseminate them over 1.0 billion mu of land it is projected that we can increase grain output 50.0 billion jin, cotton output 5.00 million dan, fruit output 1.0 billion jin, and tea output 400 million jin.

2. Fine crop varieties and cross combinations: During the Seventh 5-Year Plan more than 50 percent of all counties will establish and perfect systems to breed improved strains, and various improved crop varieties or cross combinations will be disseminated as suitable based on local conditions. The major crop varieties commonly should be replaced once. Figured based on a 10 percent increase in yield, we estimate that we can raise grain production about 30.0 billion jin and cotton production 5.00 million-plus dan. If we disseminate primarily small and medium seed-processing machinery and operating techniques we can improve seed quality and raise output approximately 5 to 10 percent. Carefully chosen seed and precision seed drilling can save approximately 4.0 to 5.0 billion jin of seed. In the next 10 years we must work from this foundation to ensure that the remaining 50 percent of all counties establish and perfect systems to breed improved strains and universally replace varieties once. If we do so it is estimated we can increase production about 10 percent.

3. Scientific fertilizer application techniques: According to pooled results of a soil survey conducted on 670 million mu of cultivated land in 901 counties throughout the 28 provinces, municipalities, and autonomous regions, Chinese soil is low in organic matter content and nutrients are out of balance. On 180 million mu of land the organic matter content is below 0.6 percent, on 1.16 billion mu phosphorous is deficient, on 410 million mu potassium is deficient, and on 200 million mu both phosphorous and potassium are lacking. If we popularize fertilizer application techniques suited to particular soils and particular crops; apply a reasonable ratio of nitrogen, phosphorous, and potassium; and adopt deep application and hole application techniques, we can distinctly improve results from fertilizer application. Based on partial statistics taken from some counties in 11 provinces and autonomous regions, if we both readjust the amount of fertilizer we use and apply a little bit of lime (in southern paddy fields) we can save about 89.00 million yuan of capital and vastly improve economic results.

4. Irrigation techniques that economize on water and improve output: Adopting field conveyance systems and seepage prevention in irrigation ditches improves the irrigation water utilization ratio by 10 percent, so we can correspondingly expand the irrigated area by 10 percent or more. Sprinkling irrigation uses approximately 30 to 50 percent of the water used by check irrigation and saves 6 to 7 percent on land used for irrigation ditches. If we expand sprinkling irrigation during the Seventh 5-Year Plan to 100 million mu, figuring a per-mu yield increase of 100 jin we can increase output 10.0 billion jin. Popularizing techniques to prevent soil damage from waterlogging and forestall soil salinization could raise yields by 20 percent or so.

5. Techniques to increase yields in dry farm cultivation: Every place has had a great deal of experience in increasing dry-farm yields. Based on a typical survey, adopting advanced dry-farm cultivation methods can produce 0.8 to 1.3 jin of grain per mu for every millimeter of precipitation. Extrapolating from this, in a locale with an annual precipitation of 300 mm the per-mu yield can be raised from the current 100-plus jin to 240 to 390 jin; where annual precipitation measures 400 mm the per-mu yield can be raised from the current 200-plus jin to 320 to 520 jin. It is estimated that China has approximately 300 million mu of cultivated land in arid and semi-arid regions. If only we conscientiously analyze our experiences and integrate traditional experience with modern science and technology, dry field crop outputs can double and redouble. If we increase yield 100 jin per mu of cultivated land we can raise production by 30.0 billion jin.

6. Comprehensive blight, insect, weed, and rodent control techniques: During the Seventh 5-Year Plan we will adopt comprehensive control measures to reduce grain losses to 3 to 5 percent, cotton losses to 5 to 8 percent, and fruit and

vegetable losses to less than 10 percent. This could redeem economic losses of about 5.0 billion yuan per year.

7. Techniques to improve low-yield land: By transforming 50 million mu of low-yield land during the Seventh 5-Year Plan and increasing the grain yield thereon by 200 jin per mu, we can increase total output 10.0 billion jin. By transforming 2.50 million mu of low-yield tea plantations and raising their per-mu yield of 30 or 40 jin up to about 150 jin, we can raise tea production a total 2.50 million dan. By transforming 1.00 million mu of low-yield rubber plantations and raising their per-mu yield of 30 or 40 kg up to 70 or 80 kg, we can increase dry rubber output 40,000 to 50,000 tons. By transforming 1.00 million mu of low-yield fruit orchards and replacing 1.00 million mu of mulberry fields we will tap further potential for yield increases in existing fruit orchards and mulberry fields. Fruit and natural silk production can be increased by a large margin and quality can also be notably improved.

8. Protective cultivation techniques: These include various sorts of crop mulches; nylon used in paddy, cotton, and peanut breeding; and plastic awnings for vegetable cultivation. By using these techniques it is estimated we can boost yields 20 percent or so. If we strive to disseminate these methods over approximately 100 million mu of land during the Seventh 5-Year Plan, we can increase economic results significantly.

9. Mechanized energy-saving cultivation techniques: In plowing and soil preparation, by adopting multiple operations and minimal plowing techniques we can save 20 jin of oil and reduce operating expenses 1.5 yuan per mu. If we extend these methods over 5.00 million mu of land during the Seventh 5-Year Plan we can save 5,000 tons of oil and 7.50 million yuan worth of operating expenses, and we can decrease the machinery investments by 20.00 million yuan. If we institute precision seed drilling for various crops it is estimated we can save an average 10 jin of seed per mu. Extended over 50.00 million mu this may save 500 million jin of seed and 1.00 million mu of controlled planting.

10. Various forms of comprehensive multiple cropping techniques: During the Seventh 5-Year Plan, in regions where natural conditions permit, labor power is abundant, and production conditions are relatively advantageous, we will, popularize various forms of multiple cropping systems suited to local conditions. For example, in the south we will popularize a triple cropping system focused on double-crop rice or on rice, corn, and wheat. In the north we will popularize double cropping of rice and wheat, corn and wheat, or corn and cotton. This will make the best use of sunlight, heat, and water resources and promote increased crop yields throughout the year. If we can extend multiple cropping over 50 to 100 million mu, figuring an increase of 100 jin per mu we can raise grain production 5.0 to 10.0 billion jin.

Although when the above ten techniques are actually applied in different regions there may be major discrepancies in results and potential yield increases, so long as we adopt measures that are suited to local conditions and pay attention to coordination and complementarity among the various techiniques, striking increases in output are possible.

C. Adopt Policies Advantageous to Agricultural Development

First, we must stabilize and perfect the output-related system of contracted household responsibility and work out a national program for agricultural development that is capable of exercising a role over a fairly long period of time. To help agricultural development we must formulate and perfect various agricultural rules and regulations, including land laws, forest laws, prairie laws, fishery laws, environmental protection laws, and so forth, as well as agricultural resource protection policies, grain and cash crop development policies, fodder development policies, rural energy policies, technical policies, agricultural intellectual investment policies, and policies dictating top prices for high-quality agricultural products.

Second, we must make further price adjustments on agricultural products and maintain equitable price parities between various farm and sideline products. We must readjust the state grain procurement base and price parities between grain crops and cash crops, reduce or eliminate state monopoly procurement bases for grain and cotton, and put into effect policies whereby contract procurement prices and market purchase prices are calculated based on stipulated proportions. At the same time, we must open up circulation channels and permit farmers to market freely or handle on their own any primary, secondary, or tertiary goods left after centrally assigned procurement responsibilities are met. We must establish a set of reasonable pricing systems and policies in order to guarantee stable growth in grain and cash crops.

Third, we must open up agricultural energy resources: in addition to opening up many channels of rural energy resources--developing fuel forests, small hydroelectric plants, methane, solar energy, and wind energy--and actively promoting various energy-saving measures, we must also consider rural production and domestic energy needs within the national energy program and ensure that there is a certain proportion of supplies.

Fourth, we must settle agricultural development funding. In the wake of advances in agricultural modernization, the proportion of funding taken up by production, as measured by per-unit output value, should be correspondingly increased. In ordinary circumstances, calculating the ratio of agricultural output value to the increment in fixed assets at 1:1.6, by the end of the century the total production investment needed in agriculture, forestry, animal husbandry, sidelines, and fishery will be approximately 1,010.0 billion yuan and the total investment needed in rural industry will be 411.7 billion yuan. The two together add up to an investment of 1,421.7 billion yuan. Of material inputs in agriculture, the cost (the state's share) for three production conditions alone--irrigation, chemical fertilizer, and farm machinery--is calculated as follows: for 1990 the high plan figures 46.8 billion yuan and the low plan figures 40.8 billion yuan; for 2000 the high plan figures 55.3 billion yuan and the low plan figures 48.1 billion yuan. Taken together, the high plan calls for 102.1 billion yuan and the low plan calls for 88.9 billion yuan, or 107.4 to 123.3 percent of the cumulative investment over the past 30 years (see Table 18). An estimate of the possible sources for overall agricultural funding is as follows: 1) Rural industrial funds that can be used to support agriculture; 2) State financed agricultural

support funds figured at 8 percent of the total investment in capital construction; 3) Production funds that can be supplied through agricultural credit; 4) Funds raised by peasants themselves, figured at 8 percent of output value. These four sources combined can provide 1,479.0 billion yuan, in a composition described by the ratio 1.2:0.6:1.5:6.7. This will essentially meet the demand for production funds.

Table 18. Calculation of the Cost of Irrigation, Chemical Fertilizer, and Farm Machinery (in billion yuan)

Task	Cumulative investment in 30 years	1980 low	1980 high	2000 low	2000 high	Total invested by year 2000 low	Total invested by year 2000 high
1) Expand irrigated area 200 million mu	51.948 (1)	25.0	30.0	25.0	30.0	50.0	60.0
2) Expand chemical fertilizer, pesticide production	22.115 (2)	13.3	13.3	18.6	18.6	31.9	31.9
3) Add to and replace farm machinery (3)	8.731	2.5	3.5	4.5	6.7	7.0	10.2
Total	82.749	40.8	46.8	48.1	55.3	88.9	102.1

Notes: (1) Cumulative investment in water conservancy 1952 to 1980.
(2) Cumulative investment in chemical fertilizer and pesticides 1952 to 1980.
(3) Future replacement of 10.00 million HP/yr, at a cost of 15 yuan/HP; annual addition of 12.00 million HP.

IV. A Regional Location Study

We have conducted a location study on China based on a division into six major natural and administrative regions: the Northeast Region (including Liaoning, Jilin, and Heilongjiang), the North China Region (including Shanxi, Hebei, Shandong, Henan, Shaanxi, Beijing, and Tianjin), the Middle and Lower Chang Jiang Region (including Hunan, Hubei, Jiangxi, Anhui, Jiangsu, Zhejiang, and Shanghai), the Southwest Region (including Yunnan, Guizhou, Sichuan, and the Xizang Autonomous Region), the South China Region (including Fujian, Guangdong, and the Guangxi Zhuang Autonomous Region), and the Northwest Region (including the Nei Mongol Autonomous Region, the Ningxia Hui Autonomous Region, Gansu, Qinghai, and the Xinjiang Uygur Autonomous Region). Here we will summarize the results of our regional calculations.

A. A Projection of Regional Demand Trends

China encompasses a vast territory, and because of differences in natural conditions and ethnic composition, as well as many years of unbalanced political, economic, and cultural development, differences in demand have formed between the various nationalities and regions.

Based on an analysis of the present situation and regional characteristics, we project that by the year 2000 quantities of food and clothing in these 6

regions will both be higher than their current base level. Dietary and clothing compositions will be considerably improved and nutritional levels and clothing standards will be significantly higher. However, because production development and economic income levels are still unbalanced between the various regions, there are still significant disparities between people's daily consumption levels. From the perspective of purchasing power, in the Middle and Lower Chang Jiang Region, the South China Region, and the Northeast Region it is fairly high, exceeding purchasing power in the other three regions by 30 percent or more; thus consumption levels there are rather high.

In animal foods, for example, by the year 2000 the average per capita consumption of meat, milk, eggs, and fish will be highest in the South China Region and the Middle and Lower Chang Jiang Region, measuring 145 jin and 131 jin, respectively; moderate in the Northeast Region, measuring 96 jin; and lowest in the North China, Northwest, and Southwest Regions, where it will measure 67 jin, 55 jin, and 68 jin, respectively. A certain disparity persists in grain, vegetable oil, sugar, vegetable, and fruit consumption as well (see Table 19). As for apparel, in addition to maintaining different characteristics of custom and habit, from the perspective of increasing consumption the situation is similar to that for food: there are significant disparities between regions. Cotton consumption is highest in the Northeast Region, measuring 25.2 chi per capita, followed by the Middle and Lower Chang Jiang Region and the Northwest Region, measuring 18 chi and 18.2 chi per capita respectively. Cotton consumption in the other three regions is quite low (see Table 20). In addition to these, we have also calculated non-ration grain use and total social demand for major agricultural products (see Tables 21 and 22). In order to attain the degree of improvement discussed above we must also carry out the necessary inter-regional adjustments on major agricultural surpluses and defecits, enhance inter-regional allocation and transport, and correspondingly improve storage and processing. Only then can we promptly meet each region's multifarious demands for agricultural goods.

B. Projected Regional Production Trends

Because of regional differences in socioeconomic conditions and natural conditions, obvious disparities in grain and cash crop production development characteristics and trends emerge between different types of regions.

1. Grain Production Development Trends (see Table 23)

First, the disparities in yield per unit of area between different types of areas will shrink somewhat. Grain output is currently highest in the Middle and Lower Chang Jiang Region, but because the multiple crop index and production base are high, in the future the rate of increase in unit yield will be comparatively slow. In the three northern regions and the Southwest region, because the multiple crop index and the production base are rather low, future increases may be relatively rapid. Comparing the south with the north, right now the per-mu yield in the Middle and Lower Chang Jiang Region is 1.66 times that in the North China Region and 2.66 times that in the Northwest Region, but by the year 2000 this disparity will shrink to factors of 1.27 and 1.98, respectively. Comparing east and west, right now the per-mu yield in the Middle and Lower Chang Jiang Region is 1.32 times that in the

Southwest Region, but this will decline to a factor of 1.02, or basically even.

Second, after grain output and demand in the various regions is balanced we can be essentially self-sufficient, but there will still be a 20.0 billion jin difference between grain transferred in and out. The Northeast Region can provide 7.5 to 12.0 billion jin of commodity grain to the outside, the North China Region can supply nearly 6.0 billion jin, and the Middle and Lower Chang Jiang Region can supply 4.0 billion jin. By contrast, the South China Region and the Northwest Region will need to transfer in at least 3.4 billion and 2.4 billion jin of commodity grain, respectively. After this is balanced there will still be 11.5 to 16.0 billion jin of grain that can be provided for export.

Table 19. China's Regional Dietary Composition and Nutritional Level (heat in kcals; protein in grams)

		Food heat energy & protein content; proportion derived from animal foods					
Region	Year	Total		Animal foods-heat		Animal foods-protein	
		Heat	Protein	Quantity	% of total	Quantity	% of total
North-east	Current	2,559	74.3	238.0	9.3	5.94	8.0
	1990	2,664	81.6	247.1	9.3	9.8	12.0
	2000	2,666	84.8	467.9	17.6	16.9	19.9
North China	Current	2,258	54.56	102	4.5	1.9	3.6
	1990	2,563	73	241	9.4	6.6	9.0
	2000	2,681	78	442	16.5	14	16
North-west	Current	2,090	46.3	171	8.2	5.14	10.66
	1990	2,481	65.4	265	10.1	8	12.23
	2000	2,505	65	338	13.5	10.8	16.61
Middle & Lower Chang Jiang	Current	2,359	53.8	224.4	9.5	4.92	9.14
	1990	2,511	56	342.8	13.6	8.29	14.8
	2000	3,031	69	554.0	18.3	17.94	26
South China	Current	2,321	56.4	209	9	9.6	17.1
	1990	2,320	63.25	319	11.6	15	23.7
	2000	2,430	71.25	421	17.4	27.2	33.9
South-west	Current	2,432.12	67.60	274.06	11.27	4.87	7.17
	1990	2,536.05	66.16	332.05	13.09	6.59	9.96
	2000	2,685.22	64.05	437.42	16.29	9.37	14.63

Average annual per capita dietary composition (in jin)											
Total grain (unprocessed)	Including Cereal	Legumes	Potatoes	Meat	Milk	Eggs	Fish	Veg. oil	Sugar	Vegetables	Fruit
495	467	28	70	25.2	6.0	7.4	6.7	7.6	7.0	350	15.7
516	484	32	70	32.2	20.0	12.0	14.0	9.9	12.0	350	17.5
468	426	42	72	52.5	45.0	25.0	18.0	13.0	12.0	350	30.0
	416			10.5	0.5	2.6	0.97	3.7	1.34		
520	490	20	50	18	5	5	2	5	2	292	5
484	455	25	20	40	13	12	3	10	8	365	15

456				24.34	9.83	3.09	1.61	7.13	3.12	168	10.4
510	497	9.0	19	32.4	33	5.7	3.9	8.4	7.31	183	18
473	463	7.4	15	40	52	9.4	5.4	11.9	12.1	241	12.3
540	530	5	5	27	5.9	7.2	7.5	6.0	3.36	273.4	3.58
507	494	8	5	42	22	12	20	10	7	340	25
507	494	8	5	67	44	24	40	12	14	304	45
521				30	0.8	3	18.6	4.6	10	262	11.5
490	457	19.5	67.5	47	9	11	35	8	16.5	275	22.5
450	419	22.5	45	80.5	27.9	19	4.5	12	23.5	265	32.5
492	387.4	9.0	95.1	33.4	1.05	3.31	1.39	3.30	3.48	240	6.95
490	406.3	12.0	71.7	41.54	5.00	4.50	3.00	6.00	6.00	272	12
489	427.5	14.0	47.5	55.3	8.00	7.00	6.00	11.00	12.00	256	25

Note: Figures for Northwestern grain consumption do not include pastries; Northeastern potatoes are primarily white potatoes, and are not included in grain calculations.

Table 20. Current and Projected Regional Individual Clothing Consumption and Total Domestic Cotton Use

Region	Date	Item: Cotton cloth Consumption (chi)	Cotton cloth Cotton equivalent (jin)	Synthetic cloth Consumption (chi)	Synthetic cloth Cotton equivalent (jin)	Cotton wadding (jin)	Total domestic cotton use (jin)
North-east	Current	18.5	1.85	6.8	0.27	0.87	3.5
	1990	16.8	1.68	10.2	0.41	1.5	4.1
	2000	16.1	1.61	16.7	0.67	1.8	4.7
North China	Current	13.5	1.35	4.5	0.18	1	8
	1990	16	1.6	15	0.6	1	4.4
	2000	10	1	20	0.8	0.5	4.6
North-west	Current	13.9	1.4	4.83	0.19	1.07	3.1
	1990	18.7	1.87	15.7	0.6	1.15	5.1
	2000	18.2	1.82	20.3	0.81	1.25	6.0
Middle & Lower Chang Jiang	Current	11.98	1.2	14.02	0.56	0.6	5.84
	1990	20.64	2.1	14.41	0.58	1	7.98
	2000	18	1.8	15	0.6	1	8.56
South China	Current	10	1.0	4	0.16	0.3	2.76
	1990	13.5	1.4	9.5	0.38	0.4	3.78

	2000	16	1.6	16	0.64	0.3	4.27
South-west	Current	10.87	1.09	3.05	0.12	0.3	2.5
	1980	11.1	1.1	4.9	0.2	0.4	3.0
	2000	11	1.1	7.9	0.32	0.6	3.6

Table 21. Regional Non-ration Grain Use in 1990 and 2000 (in billion jin)

1990

Plan	Seed I	Seed II	Fodder I	Fodder II	Industry I	Industry II	New reserves I	New reserves II	Spoilage I	Spoilage II	Total I	Total II
Region												
Northeast	4.0	4.0	14.7	20.6	1.5	1.5	0.1	0.1	2.6	2.8	22.9	29.0
North China	10.1	10.1	33.7	44.9	12.5	13.4	1.5	1.5	2.1	2.2	55.8	72.1
Northwest	3.6	4.02	10.6	11.0	.256	.283	.051	.051	1.18	1.31	15.7	16.7
Middle & Lower Chang Jiang	15.2	61.2	67.7	68.7	17.0	18.0	.3	.3	8.3	8.3	108.5	111.5
South China	3.6	3.7	30.9	34.8	1.96	2.9	.14	.15	.9	.95	37.5	42.5
Southwest	6.42	6.42	25.89	25.89	4.46	4.46	6.53	11.73	1.82	1.82	45.11	50.31

2000

Plan	Seed I	Seed II	Fodder I	Fodder II	Industry I	Industry II	New reserves I	New reserves II	Spoilage I	Spoilage II	Total I	Total II
Region												
Northeast	4.3	4.3	27.3	35.9	3.0	3.0	.08	.07	3.4	3.6	38.1	46.9
North China	9.8	9.9	54.8	78.7	23.1	24.7	1.45	1.45	2.5	2.7	91.65	117.45
Northwest	3.6	4.08	13.23	14.53	.33	.37	.052	.052	1.5	1.7	18.7	20.7
Middle & Lower Chang Jiang	14.5	15.5	92.8	93.8	26.2	27.2	.28	.28	8.0	8.0	141.8	144.8
South China	3.6	3.8	49.4	56.6	2.86	3.7	.14	.15	1.0	1.15	57.0	65.4
Southwest	6.26	62.6*	40.63	40.63	6.32	6.32	14.78	17.18	2.13	2.13	70.12	72.52

Note: Figures for Northeast industrial grain use do not include grain used in food products.
*[Figure as published]

Table 22. Regional Social Demand for Major Agricultural Products (grain, oil crops, sugar crops, vegetables, and fruit measured in billion jin; cotton measured in million dan)

Region	Date	Plan	Grain Total	Grain Domestic consumption	Crop Cotton Total	Crop Cotton Domestic consumption	Oil Crops Total	Oil Crops Domestic consumption
Northeast	1990	I	84.90	53.20	4.05	4.05	.86	.86
		II	88.40	49.90	4.05	4.05	1.43	1.43
	2000	I	105.50	55.40	4.71	4.71	1.88	1.88
		II	110.7	50.30	4.71	4.71	2.20	2.20
North China	1990	I	220.7	155.6	43.14	14.53	6.5	5.3
		II	220.7	143.4	48.95	12.29	7.5	6.4
	2000	I	262.2	163.2	44.00	15.62	9.6	8.4
		II	274.4	149.8	49.80	15.76	11.0	10.2
Middle and Lower Chang Jiang	1990	I	272.7	164.2	28.40	1.29	6.755	
		II	275.7	164.2	33.74	1.62	11.00	9.6
	2000	I	317.6	175.8	35.91	1.74	16.00	12.6
		II	320.6	175.8				
Southwest	1990	I	113.72	88.30		5.31		3.59
		II	133.72	88.30		5.31		3.59
	2000	I	149.52	96.37		7.18		7.39
		II	149.52	96.37		7.18		7.39
South China	1990	I	102.9	65.4	3.30	2.99	2.48	2.4
		II	111.1	68.6	3.54	2.99	3.17	3.06
	2000	I	122.9	66.4	4.14	3.89	4.35	4.21
		II	135.3	70.4	4.84	3.89	5.08	4.91
Northwest	1990	I	48.7	33.0	5.94	3.32	2.1	1.94
		II	51.7	35.0	6.34	3.32	2.27	2.06
	2000	I	52.3	33.6	7.45	4.27	2.9	2.6
		II	58.8	38.1	8.44	4.84	3.3	3.0

(Table 22 continued)

Region	Date	Plan	Sugar crops Total	Sugar crops Domestic consumption	Crop Total	Fruit Domestic consumption	Vegetables Total	Vegetables Domestic consumption
Northeast	1990	I	9.23	9.23	1.5	1.5	35.0	35.0
		II	9.23	9.23	2.0	2.0	35.0	35.0
	2000	I	10.43	10.43	2.8	2.8	39.6	30.6
		II	10.43	10.43	2.96	2.96	39.59	39.59
North China	1990	I	1.32	1.15		2.31	84.8	84.8
		II	1.65	1.72		2.85	102.0	102.0
	2000	I	2.4	2.55		4.8	114.8	114.8
		II	2.7	3.85		6.4	119.5	119.5
Middle and Lower Chang Jiang	1990	I	16.2	8.1				
		II	37.6	17.7	8.9	8.1		97.2
	2000	I	75.2	35.0	17.2	15.6		105.4
		II						
Southwest	1990	I		13.39		2.14		60.66
		II		13.39		2.14		60.66
	2000	I		30.797		4.94		63.18
		II		30.797		4.94		63.18
South China	1990	I	19.6	19.6	2.74	2.74	37.04	37.08
		II	23.3	23.3	3.4	3.4	38.11	38.11
	2000	I	30.6	30.6	4.59	4.59	39.78	39.77
		II	34.3	34.3	5.29	5.29	40.77	40.77
Northwest	1990	I	3.56	3.4	1.519	1.215	12.36	12.36
		II	3.78	3.6	1.544	1.235	12.56	12.56
	2000	I	6.02	5.73	2.672	2.138	18.83	18.87
		II	6.82	6.5	2.748	2.210	19.41	19.41

Note: Total refers to the combination of domestic consumption and other social consumption. Domestic grain consumption refers to ration grain. Domestic grain consumption for the Northeast Region includes ration grain and grain used in food products.

Table 23. Regional Grain Development Plans*

Grain Crops

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
Northeast	Current	207.00	319	66.0			
	1990	211.06	407	85.9	211.06	422	89.1
	2000	234.00	478	112.0	234.00	505	118.3
North China	Current	479.15	351	168.0			
	1990	500.60	421	215.1	500.60	441	223.0
	2000	495.00	518	256.6	490.00	560	273.4
Northwest	Current	146.98	220	32.4			
	1990	150.00	262	39.3	167.50	260	43.6
	2000	150.00	333	50.0	170.00	331	56.3
Middle & Lower Chang Jiang	Current	460.59	585	269.7			
	1990	459.92	599	275.4	455.94	621	283.0
	2000	468.72	660	309.4	468.72	687	322.2
South China	Current	165.65	500	82.9			
	1990	159.78	597	95.3	165.70	577	95.6
	2000	166.40	670	111.5	171.40	700	120.0
Southwest	Current	242.07	445	107.6			
	1990	249.53	522	130.2	248.30	546	135.6
	2000	253.57	646	163.9	250.40	664	166.3
National	Current	1,700.94	416	706.9			
	1990	1,730.74	486	841.2	1,749.10	497	869.8
	2000	1,768.09	568	1,003.4	1,784.52	592	1,056.5

Rice

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
Northeast	Current	13.58	691	9.4			
	1990	19.25	734	14.1	19.25	750	14.4
	2000	20.30	830	16.9	20.30	850	17.3
North China	Current	12.83	656	8.4			
	1990	17.68	720	12.7	17.68	730	12.9
	2000	19.80	780	15.4	19.60	850	16.7
Northwest	Current	2.47	632	1.6			
	1990	2.50	680	1.7	2.50	680	1.7
	2000	2.50	700	1.8	2.50	700	1.8
Middle & Lower Chang Jiang	Current	266.06	680	181.0			
	1990	266.00	760	197.6	256.22	780	199.9
	2000	269.00	800	215.2	269.00	820	220.6
South China	Current	125.86	578	72.7			
	1990	121.43	680	82.6	125.93	660	83.1
	2000	128.13	760	97.4	131.99	780	103.0
Southwest	Current	75.15	688	51.7			
	1990	76.88	765	58.8	76.91	790	60.7
	2000	80.88	878	71.0	81.21	893	72.4

	2000	6.66	400	2.7	6.86	420	2.9
	Current	52.26	415	21.7			
Southwest	1990	54.03	531	28.7	54.13	546	29.6
	2000	54.57	683	37.3	54.57	688	37.5
	Current						
National	1990						
	2000						

(Table 23 continued)

Potatoes

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
	Current	5.40	276	1.5			
Northeast	1990	4.50	340	1.5	4.50	380	1.7
	2000	5.00	420	2.1	5.00	450	2.3
	Current	43.55	436	19.0			
North China	1990	47.50	480	22.8	47.50	400	23.8
	2000	34.60	590	20.4	31.90	650	20.7
	Current	8.58	179	1.5			
Northwest	1990	8.00	220	1.8	8.50	220	1.9
	2000	8.00	240	1.9	8.50	240	2.0
Middle &	Current	29.56	450	13.3			
Lower	1990	25.00	490	12.3	25.00	520	13.0
Chang Jiang	2000	25.00	650	16.3	25.00	700	17.5
	Current	16.37	330	5.4			
South China	1990	16.57	400	6.6	15.98	420	6.7
	2000	18.30	500	9.2	18.86	520	9.8
	Current	35.48	347	12.3			
Southwest	1990	35.00	438	15.3	34.50	472	16.3
	2000	32.81	634	20.8	32.31	650	21.0
	Current						
National	1990						
	2000						

Millet

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
	Current	21.21	173	3.7			
Northeast	1990	22.50	237	5.3	22.50	250	5.6
	2000	24.70	300	7.4	24.70	350	8.7
	Current	28.35	276	7.8			
North China	1990	29.30	330	9.7	29.30	330	9.7
	2000	31.00	360	11.2	32.80	400	13.1
	Current	10.54	150	1.6			
Northwest	1990	8.00	160	1.3	8.00	160	1.3
	2000	8.00	180	1.4	8.00	180	1.4
Middle &	Current	.23	201	.05			
Lower	1990	.18	220	.04	.18	210	.04

	Current	495.84	650	322.5			
National	1990	497.74	738	367.5	468.83	795	372.7
	2000	520.61	802	417.7	524.60	823	431.5

(Table 23 continued)

Wheat

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
	Current	30.58	195	6.0			
Northeast	1990	33.60	290	9.7	33.60	300	10.1
	2000	41.20	400	16.5	41.20	420	17.3
	Current	188.84	337	63.7			
North China	1990	200.00	400	80.0	200.00	410	82.0
	2000	212.80	470	100.0	210.70	500	105.4
	Current	62.67	253	15.9			
Northwest	1990	70.00	270	18.9	75.00	270	20.3
	2000	70.00	350	24.5	78.00	350	27.3
Middle &	Current	88.30	396	35.0			
Lower	1990	91.20	430	39.2	91.20	450	41.0
Chang Jiang	2000	91.20	510	46.5	91.20	540	49.2
	Current	3.50	240	.8			
South China	1990	3.31	300	1.0	3.20	320	1.0
	2000	3.33	360	1.2	3.43	380	1.4
	Current	45.40	328	14.9			
Southwest	1990	47.70	387	18.4	46.70	411	19.2
	2000	50.30	487	24.5	48.50	499	24.2
	Current						
National	1990						
	2000						

Corn

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
	Current	61.87	477	29.5			
Northeast	1990	59.70	570	34.0	59.70	590	35.2
	2000	60.00	670	40.2	60.00	700	42.0
	Current	117.00	456	53.4			
North China	1990	127.30	570	72.6	127.30	600	76.4
	2000	126.00	700	88.2	125.00	750	93.8
	Current	19.10	309	5.9			
Northwest	1990	18.00	420	7.6	20.00	420	8.4
	2000	18.00	530	9.5	20.00	530	10.6
Middle &	Current	8.84	292	2.6			
Lower	1990	22.80	480	10.9	22.80	500	11.4
Chang Jiang	2000	22.80	570	13.0	22.80	600	13.7
	Current	8.84	292	2.6			
South China	1990	8.28	350	2.9	7.99	380	3.0

Chang Jiang	2000	.18	250	.05	.18	270	.05
	Current						
South China	1990						
	2000						
	Current						
Southwest	1990						
	2000						
	Current						
National	1990						
	2000						

(Table 23 continued)

		Sorghum					
		Plan 1			Plan 2		
Region	Date	Area	Per-mu yield	Gross output	Area	Per-mu yield	Gross output
	Current	18.73	366	6.9			
Northeast	1990	18.50	533	9.9	18.50	550	10.2
	2000	19.00	630	12.0	19.00	650	12.4
	Current	14.93	268	4.0			
North China	1990	15.15	310	4.7	15.15	330	5.0
	2000	13.80	400	5.5	13.72	500	6.9
	Current	4.41	231	1.0			
Northwest	1990	3.50	290	1.0	3.50	290	1.0
	2000	3.00	350	1.1	3.50	350	1.2
Middle &	Current	1.99	186	.4			
Lower	1990	1.28	260	.3	1.28	280	.4
Chang Jiang	2000	1.28	400	.5	1.28	420	.6
	Current						
South China	1990						
	2000						
	Current						
Southwest	1990						
	2000						
	Current						
National	1990						
	2000						

		Variety grains					
		Plan 1			Plan 2		
Region	Date	Area	Per-mu yield	Gross output	Area	Per-mu yield	Gross output
	Current	7.78	176	1.4			
Northeast	1990	6.31	230	1.5	6.31	250	1.6
	2000	6.80	300	2.0	6.80	350	2.4
	Current	31.70	173	5.5			
North China	1990	26.80	250	6.7	26.80	250	6.7
	2000	18.60	350	6.5	20.00	330	6.6
	Current	34.51	122	4.2			
Northwest	1990	35.00	180	6.3	45.00	180	8.1

	2000	35.00	250	8.8	45.00	250	11.3
Middle &	Current	31.07	342	10.6			
Lower	1990	31.90	350	10.2	31.90	370	11.8
Chang Jiang	2000	31.90	370	11.8	31.90	400	12.8
	Current	3.43	122	.4			
South China	1990	4.14	200	.8	3.99	210	.8
	2000	3.42	250	.9	3.33	270	.9
	Current	28.58	214	6.1			
Southwest	1990	29.41	258	7.6	29.05	280	8.1
	2000	26.80	303	8.1	25.30	346	8.8
	Current						
National	1990						
	2000						

(Table 23 continued)

		Soybeans					
		Plan 1				Plan 2	
Region	Date	Area	Per-mu yield	Gross output	Area	Per-mu yield	Gross output
	Current	47.71	164	7.8			
Northeast	1990	46.70	210	9.8	46.70	220	10.3
	2000	57.00	260	14.8	57.00	280	16.0
	Current	36.10	118	4.3			
North China	1990	36.87	160	5.9	36.87	180	6.6
	2000	37.00	250	9.3	37.70	300	11.3
	Current	4.62	141	.7			
Northwest	1990	5.00	155	.8	5.00	155	.8
	2000	5.00	175	.9	5.00	175	.9
Middle &	Current	24.93	142	3.5			
Lower	1990	27.36	180	4.9	27.36	200	5.5
Chang Jiang	2000	27.36	220	6.0	27.36	280	7.7
	Current	7.64	122	.9			
South China	1990	7.46	150	1.1	7.19	160	1.2
	2000	6.66	180	1.3	6.84	180	1.2
	Current	5.21	171	.9			
Southwest	1990	6.51	208	1.4	7.01	250	1.8
	2000	8.21	265	2.2	8.71	282	2.5
	Current						
National	1990						
	2000						

*[Source does not specify units of measurement. From previous tables they are assumed to be 10,000 mu, jin, and 100 million jin, converted here to million mu, jin, and billion jin.]

Third, a significant regional imbalance in grain varieties persists. The three northern regions have only about 50 percent as much rice and wheat as the three southern regions, whereas the south has less than 40 percent as much corn as the north. Consequently, southern regions can cut out some low-yield

paddy land and convert it to soybeans or corn and other fodder crops, and the north can actively expand wheat and paddy cultivation. This will reduce the excessive quantity of grain allocated and transported between the two macro-regions. The corn surplus in the Northeast Region can be converted on the spot into livestock products or processed foods. The Northeast Region and the North China Region account for 70 percent of China's soybean production; the Northeast Region alone will be able to supply 4.0 to 6.0 billion jin of soybeans by the end of the century. On the other hand, in the three southern regions and the Northwest Region soybean growing area accounts for only 5 percent and 3 percent, respectively, of the total sown grain area. We need to transfer soybeans into these regions and also suitably expand soybean cultivation there.

2. Cash Crop Production Development Trends (see Table 24)

First, the inter-regional disparities in major cash crop yields per unit of

Table 24. Regional Cash Crop Development Plans (in million mu, jin, and million dan)

Region	Date	Cash Crops Plan 1 Area	Cash Crops Plan 2 Area
Northeast	Current	20.18	
	1990	33.00	33.00
	2000	39.15	39.15
North China	Current	94.35	
	1990	94.50	88.50
	2000	90.00	94.00
Northwest	Current	24.00	
	1990	33.83	24.72
	2000	38.23	29.42
Middle & Lower Chang Jiang	Current	85.91	
	1990	85.34	85.14
	2000	85.20	84.80
South China	Current	27.28	
	1990	32.28	31.12
	2000	33.00	32.00
Southwest	Current	30.18	
	1990	34.17	34.17
	2000	39.18	39.18

Region	Date	Cotton Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
Northeast	Current	.70	67	.47			
	1990	1.20	90	1.08	1.20	100	1.20
	2000	1.00	120	1.20	1.00	100	1.00
	Current	49.17	78	38.48			

North China	1990	43.14	100	43.14	44.50	110	48.95
	2000	41.50	120	49.80	40.00	110	44.00
	Current	4.37	69	3.02			
Northwest	1990	5.50	100	5.50	6.00	92	5.52
	2000	7.63	140	10.64	10.00	130	13.00
Middle &	Current	30.98	91	28.32			
Lower	1990	27.28	118	32.19	27.43	110	31.45
Chang Jiang	2000	27.11	130	35.30	27.36	120	32.83
	Current	.05	29	.01			
South China	1990	.044	50	.022	.045	50	.023
	2000	.03	60	.018	.03	60	.018
	Current	2.16	78	1.68			
Southwest	1990	2.41	99	2.39	2.41	99	2.17
	2000	2.61	130	3.39	2.61	122	3.17

(Table 24 continued)

Oil Crops

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
Northeast	Current	10.50	189	19.80			
	1990	16.00	190	3.04	16.00	200	32.00
	2000	16.80	240	40.32	16.82	220	36.96
North China	Current	33.17	168	55.81			
	1990	33.60	180	60.48	36.00	200	72.00
	2000	37.50	292	108.75	36.50	250	91.25
Northwest	Current	16.85	111	18.77			
	1990	18.00	167	30.00	23.08	130	30.00
	2000	17.00	194	33.00	21.85	151	33.00
Middle & Lower Chang Jiang	Current	46.56	166	77.37			
	1990	50.88	212	107.80	50.88	179	90.95
	2000	50.76	287	145.80	50.76	234	118.63
South China	Current	11.89	175	20.81			
	1990	16.50	230	38.09	17.30	230	39.66
	2000	17.00	308	52.36	18.10	280	50.76
Southwest	Current	19.06	204	39.73			
	1990	21.33	233	49.65	21.33	221	47.05
	2000	26.35	284	72.17	26.35	260	67.19

Sugar Crops

Region	Date	Plan 1 Area	Plan 1 Per-mu yield	Plan 1 Gross output	Plan 2 Area	Plan 2 Per-mu yield	Plan 2 Gross output
Northeast	Current	4.78	1,670	79.85			
	1990	9.40	2,500	235.00	9.40	3,000	282.00
	2000	11.40	4,000	456.00	11.40	3,500	399.00
North China	Current	.55	2,091	11.50			
	1990	.60	2,400	14.40	.60	2,400	14.40
	2000	1.20	3,600	43.20	1.00	3,600	36.00
Northwest	Current	1.49	2,761	41.11			
	1990	2.87	3,000	86.16	3.62	2,800	101.36
	2000	3.73	4,000	149.20	5.15	3,800	195.70
Middle & Lower Chang Jiang	Current	.79	5,794	45.72			
	1990	1.29	8,000	103.20	1.29	7,700	99.33
	2000	1.14	9,650	110.00	1.14	9,650	110.00
South China	Current	7.26	7,837	568.83			
	1990	7.30	9,600	700.80	7.60	10,000	760.00
	2000	7.70	11,600	893.20	7.80	11,000	858.00
Southwest	Current	1.67	6,430	107.63			
	1990	2.90	7,173	208.09	2.90	6,900	200.17
	2000	3.12	8,115	253.26	3.12	7,800	243.44

(Table 24 continued)

		Fiber Crops					
		Plan 1			Plan 2		
Region	Date	Area	Per-mu yield	Gross output	Area	Per-mu yield	Gross output
	Current	1.16	93	1.54			
Northeast	1990	3.40	169	5.75	3.40	176	5.98
	2000	3.00	214	6.42	3.00	199	5.97
	Current	1.44	351	5.03			
North China	1990	1.80	370	6.66	1.40	390	5.46
	2000	1.00	410	4.10	1.10	400	4.40
	Current	.11	65	.07			
Northwest	1990	.11	110	.12	.11	110	.12
	2000	.11	110	.12	.11	110	.12
Middle &	Current	2.40	533	12.79			
Lower	1990	2.40	630	15.12	2.65	605	16.03
Chang Jiang	2000	2.40	590	14.16	2.65	590	15.64
	Current	.58	488	2.82			
South China	1990	1.05	550	5.78	1.10	550	6.05
	2000	1.10	625	6.88	1.30	576	7.49
	Current	.70	366	2.54			
Southwest	1990	.38	420	1.58	.38	400	1.51
	2000	.39	500	1.94	.39	480	1.86

		Tobacco						Other crops
		Plan 1			Plan 2			
Region	Date	Area	Per-mu yield	Gross output	Area	Per-mu yield	Gross output	Area
	Current	1.12	247	2.96				17.92
Northeast	1990	1.00	297	2.97	1.00	307	3.07	
	2000	1.00	317	3.10	1.00	297	2.97	
	Current	6.06	303	18.39				27.82
North China	1990	4.00	310	12.40	4.00	310	12.40	
	2000	4.30	330	14.19	4.20	320	13.44	
	Current	.15	170	.26				14.43
Northwest	1990	.12	250	.31	.12	250	.31	
	2000	.12	250	.31	.12	250	.31	
Middle &	Current	5.54	124	6.86				98.25
Lower	1990	1.59	300	4.77	1.59	280	4.45	
Chang Jiang	2000	1.69	350	5.92	1.79	330	5.91	
	Current	1.46	186	2.73				12.26
South China	1990	1.20	240	2.88	1.40	240	3.36	
	2000	1.00	300	3.00	1.05	280	2.94	
	Current	6.33	191	12.10				16.80
Southwest	1990	6.00	250	15.00	6.00	230	13.80	
	2000	5.50	300	16.50	5.50	280	15.40	

area will also be obviously on the decline. Right now the per-mu cotton yield in the Middle and Lower Chang Jiang Region is 1.17 times, 1.32 times, 1.36

times, and 1.17 times as much as in the North China, Northwest, Northeast, and Southwest Regions, respectively. By the end of this century these differences will drop to factors of 1.08, 0.93, 1.08, and 1.00, respectively, which means that inter-regional per-mu cotton yields will be essentially the same. Thus, we will have achieved relatively balanced production increases.

Second, to make the best use of regional advantages so as to achieve regionalized cash crop production, the quantity of products allocated and transported between regions will increase further. The Southwest, South China, and Northeast Regions respectively will need to transfer in 3.80 million, 4.84 million, and 4.40 million dan of cotton for domestic use. In general this is about 50 percent more than they bring in today, and most of it will be supplied by the North China and Middle and Lower Chang Jiang Regions. Cotton production is developing rapidly in the Northwest Region, and the area can now divert 3.00 million dan or more of cotton, including about .90 million dan of long-staple cotton. Because oil crop varieties are not [word omitted in source] in the various regions, except for the need to make varietal adjustments, each region can be basically self-sufficient or produce a slight surplus. In the Northeast Region some soybean oil can be transferred out. Because essentially no sugar is produced in the Middle and Lower Chang Jiang Region and the North China Region, and very little is produced in the Northwest Region, considerable inter-regional sugar allocation and transport is needed. The South China Region will soon be able to transfer out 0.40 to 0.90 million tons of cane sugar, the Northeast Region can transfer 2.30 to 2.80 million tons of beet sugar, and the Northwest region can transfer .70 to 1.00 million tons of beet sugar. Thus we can basically achieve self-sufficiency in sugar.

C. Steps We Must Take To Achieve Regional Development Goals

To achieve production development goals in each region and reduce inter-regional disparities as far as possible, we must adopt various effective measures to handle material inputs (see Table 25), technology, and economic policy. Only then can we ensure that regional advantages are put to the best use.

The Northeast Region: The Northeast is China's primary producer of grain, soybeans, and sugar beets. The area is rather highly mechanized, and by the year 2000 there will be 13.4 HP of farm machine power for each 100 mu of cultivated land. The region will use 118.2 jin of chemical fertilizer and 29.8 kwh of electricity per mu of cultivated land and increase the ratio of irrigated land from the current 12.7 percent to 31.2 percent. As for increasing commodity grain, the focus should be on increasing unit yields on existing cultivated land and making reasonable adjustments in the proportions of spring wheat, corn, soybeans, sorghum, and millet. On low-lying land that has abundant water resources we should create the conditions for paddy development and increase our proportion of fine grain. Low temperatures and cold damages affect a broad portion of the Northeast Region and do a considerable amount of harm. We should work to surmount this through technological reforms such as planting proper proportions of early, midseason, and late rice; sowing seed at the appropriate time; using plastic sheeting on seedling transplants; and popularizing soil-surface warming agents. At the

same time, we should remain well in control during the harvest season to insure that all harvest factors are in correspondence with one another. Only then can we avoid cold injury and achieve our goal of stable growth in output.

Table 25. Development Forecast for Regional Material Inputs

Region	Date	Cultivated area & proportion of Chinese land: Million mu	% of China	Total chemical fertilizer (million tons): Plan 1	Plan 2	Total effectively irrigated area (million mu): Plan 1	Plan 2
	1978-1982	254.697	17.1	4.793		32.263	
Northeast	1990	252.00	17.0	7.598	8.114	52.00	58.50
	2000	251.40	17.0	12.100	14.858	70.00	78.50
	1978-1982	444.655	29.9	17.693		217.317	
North	1990	442.230	29.9	22.801	24.30	241.35	244.60
China	2000	441.80	29.9	36.294	44.578	273.35	279.60
	1978-1982	194.133	13.1	1.587		73.744	
Northwest	1990	194.00	13.1	3.802	4.055	88.75	88.80
	2000	193.50	13.1	6.656	8.920	107.25	108.80
Middle &	1978-1982	313.314	21.1	19.328		211.632	
Lower	1990	311.70	21.1	25.00	28.50	216.70	217.70
Chang Jiang	2000	310.90	21.1	36.298	46.06	224.20	225.70
	1978-1982	106.620	7.2	7.007		65.065	
South	1990	106.00	7.2	9.879	10.123	70.10	70.20
China	2000	105.30	7.2	15.126	16.349	75.10	76.20
	1978-1982	173.145	11.7	6.649		68.176	
Southwest	1990	173.00	11.7	9.117	9.723	80.20	84.00
	2000	172.50	11.7	14.515	17.828	100.20	105.00
	1978-1982	1,486.561	100	57.057		668.197	
National	1990	1,479.00	100	78.221	80.162	749.10	763.80
total	2000	1,475.40	100	120.994	148.593	850.10	873.80

Region	Date	Total agricultural machine power (million HP): Plan 1	Plan 2	Total rural electricity consumption (billion kwh): Plan 1	Plan 2	Amount of chemical fertilizer per mu of cultivated land (jin): Plan 1	Plan 2
	1978-1982	22.034		4.99		37.6	
Northeast	1990	25.00	25.80	5.9	6.1	60.3	64.4
	2000	28.20	33.64	6.8	7.5	96.3	118.2
	1978-1982	70.98		11.63		79.6	
North	1990	84.00	86.00	13.4	14.3	103.1	109.9
China	2000	90.75	108.60	15.4	17.0	164.3	201.8
	1978-1982	14.927		2.03		16.4	
Northwest	1990	17.60	18.50	2.4	2.5	39.2	41.8
	2000	19.10	22.82	2.9	3.0	68.8	92.2
Middle &	1978-1982	55.927		10.48		123.4	
Lower	1990	66.00	67.60	13.0	13.5	160.4	182.9
Chang Jiang	2000	71.50	85.50	14.0	15.0	233.5	296.3

	1978-1982	17.595		2.75		131.4	
South	1990	21.00	21.60	3.2	3.4	186.4	191.0
China	2000	22.45	26.83	3.7	4.0	287.3	310.5
	1978-1982	14.834		2.39		76.8	
Southwest	1990	17.50	18.40	2.8	2.9	105.4	112.4
	2000	19.00	22.72	3.5	4.5	168.3	206.7
	1978-1982	1,962.907		34.27		76.8	
National	1990	231.00	237.90	40.7	42.7	105.8	114.1
total	2000	251.00	300.16	46.3	51.0	164.0	201.4

(Table 25 continued)

Region	Date	% of cultivated land effectively irrigated (%)		Farm machine power per 10,000 mu of cultivated land (HP)		Electricity consumed per mu of cultivated land (kwh)	
		Plan 1	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2
	1978-1982	12.7		865		15.6	
Northeast	1990	20.6	23.3	992	1,024	23.4	25.5
	2000	27.8	31.2	1,119	1,338	27.0	29.8
	1978-1982	48.9		1,596		26.1	
North	1990	54.6	55.3	1,899	1,944	30.3	32.3
China	2000	61.9	63.3	2,054	2,458	34.8	38.4
	1978-1982	38.0		769		10.4	
Northwest	1990	45.7	45.8	907	954	12.3	18.9
	2000	55.4	56.2	987	1,179	15.0	15.5
Middle &	1978-1982	67.5		1,785		33.4	
Lower	1990	69.5	69.8	2,117	2,169	41.7	43.3
Chang Jiang	2000	72.1	72.6	2,300	2,752	45.0	48.2
	1978-1982	61.0		1,650		25.8	
South	1990	66.1	66.2	1,981	2,038	30.2	32.0
China	2000	71.3	72.4	2,132	2,548	35.1	38.0
	1978-1982	39.4		857		13.8	
Southwest	1990	46.4	48.6	1,012	1,064	16.2	16.7
	2000	58.1	60.9	1,101	1,317	20.3	26.1
	1978-1982	45.0		1,321		23.0	
National	1990	50.6	51.6	1,563	1,609	27.5	28.9
	2000	57.6	59.2	1,701	2,034	31.4	34.5

The North China Region: This is China's concentrated production zone for winter wheat and for cotton, peanuts, and other cash crops. From a long-term perspective, based on the best use of this region's advantages—its level and unbroken land, vast irrigated land area, high degree of mechanization, convenient communications and transportation, ample labor power, and good sunlight and heat conditions--we should integrate grain and cash crop production closely with diversified economic pursuits. We must actively adopt high-quality improved varieties, perfect irrigation and drainage facilities, improve low-yield soils, perfect fertilizer application techniques, and promote both high quality and high output. Just because cotton brings high economic results we absolutely cannot blindly pursue quantity and neglect to improve staple quality. We can raise the per-mu yield in this region to about

500 mu if we can accomplish the following tasks: resolve one or two key problems that affect production development, guarantee that 160 jin or more of chemical fertilizer is applied per mu, bring effectively irrigated area up to 63 percent, increase total farm machine power to 25 HP per 100 mu, focus on increasing mechanical components and equipment to fight natural disasters, and increase electrical consumption to 40 kwh per mu of cultivated land.

The Northwest Region: Because this region is situated in an arid and semi-arid zone, water resources are scarce, and water and soil erosion is severe, all measures must be directed toward achieving a beneficial ecological cycle. We must seek a breakthrough by cultivating grass and trees, raising windbreaks, binding sand, and forestalling water and soil erosion. We must arrange all measures to suit local conditions. At the same time, we must scientifically review drought resisting cultivation techniques in each locale, make the most of the rain that falls, and store the summer rain through the fall for use in the spring. We should employ measures to preserve soil moisture, inculding deep plowing, harrowing, smoothing, and rolling, and we should strive to see that 1 jin of grain is produced for each mm of precipitation. We should further coordinate these measures with suitable material inputs and ensure that the amount of chemical fertilizer we use is increased from the current 16.4 jin to 70 jin per mu. The area of effective irrigation should be raised 18 percent over the current level and total agricultural machine power should be improved 50 percent. Comprehensive application of these measures alone might raise the national unit grain yield from 204 jin to about 320 jin, bringing gross output up to nearly 50.0 billion jin and fixing per capita grain holdings at approximately 700 jin.

Southwest Region: In the Southwest Region the topography is complex, the climate is temperate, water resources are abundant, and there are conditions advantageous to both diversified economic enterprises and grain production development. Except for the Chengdu Plain most of the land is composed of mountains, hills, and small basins and it is known as the land of three-dimensional agriculture. Non-irrigated land comprises a rather large proportion (63.9 percent) of the existing cultivated land and irrigated land comprises rather little (36.1 percent). Through readjustments, the single-crop paddy area was expanded slightly and the multiple crop index may rise from the current 154.3 percent to 170 to 180 percent. In addition to increasing chemical fertilizers (applications should reach 170 jin or more per mu), farm machine power (to 13 HP or more per 100 mu), and other inputs, we must also make the best use of abundant water resources to develop small hydroelectric stations, methane gas, and other rural energy resources. Furthermore, we must develop on-the-spot agricultural and sidelines processing industries and envigorate the rural economy. In addition, several southwestern cash crops--oil crops, citrus fruit, tea, ramie, and flue-cured tobacco--are nationally very important. This is the traditional production zone for these cash crops and we should make major efforts to develop them, but because communications and transportation are inconvenient it is difficult to market them outside the province. In the future we must work conscientiously to carry out farmland capital construction centered around soil and water conservation. We must harness the rivers and improve the land, increase inputs, reform the cropping system, and improve the level of grain

production. If we do so, it is completely possible that we will become more than self-sufficient in this region.

The Middle and Lower Chang Jiang Region: This region is China's concentrated production zone for double-crop rice, cotton, oil crops, fiber crops, silk, and tea. It has a warm, moist climate, plentiful water resources, ample labor power, a high degree of intensive farming, and an excellent agricultural production base. In the future, building upon a foundation of the best use of advantageous conditions for paddy production, we must readjust the cropping system; adopt improved varieties; practice intensive and meticulous farming; tap the potentials for increased yields in early, midseason, and single-crop late rice; improve rice quality, and raise the yield per unit of area. As for farmland irrigation techniques, we must enhance efforts to coordinate water conservancy construction projects as early as possible. Furthermore, we should concentrate on dredging rivers, lakes, and branching streams; we should lower the water table under the network of waterways on the plains paddy district; and, once and for all, we should correct damages from flooding, waterlogging, and standing floodwater on low-lying land. In addition, we must increase applications of pig manure, grass and pond sludge, green manure, stocked green duckweed, and other organic fertilizers. Then, building on this foundation, we should improve the compostion of chemical fertilizers, suitably control the quantity of nitrogenous fertilizer used, raise the proportions of phosphate and potash fertilizers, and approximately double the quantity of chemical fertilizer used per mu. Farm machine power should be increased 50 percent, and the stress should be on adding to irrigation and drainage machinery, fielding complementary machine units, and improving the capacity to resist natural disasters. Simultaneously, we should open ditches to drain the water from cold soggy fields, winter saturated fields, and muddy fields in hilly and mountainous areas, as well as from deepwater fields along the Chang Jiang and on lakeshores. We should then improve the soil, institute wet and dry crop rotation, and promote better use of the potential for balanced production increases.

South China: This region is situated in the southern subtropical and tropical zone. Most of the area experiences no annual frost, and all four seasons are suitable for agriculture. South China is China's primary producer of sugarcane and tropical and subtropical fruits, in addition to double-crop rice. The area is also suitable for growing rubber, coconuts, coffee, oil palms, and various other tropical crops. From an overall perspective, we must get better control of paddy production and ensure stable growth in gross grain output. In addition to exploiting the advantages of early rice, we should stress better management of late rice and improve unit yields, particularly on low- and moderate-yield paddy. Simultaneously, we should strive to develop tropical crops, especially rubber, replace low-yield saplings, and improve rubber output. We should make appropriate adjustments in sugarcane composition. In southwestern Guangdong and the southern portion of the Guangxi Zhuang Autonomous Region dry-field sugarcane cultivation is widespread. In these areas we should promote wet-field sugarcane cultivation and put wet and dry crop rotation into effect. We also need to improve the output per unit of area and increase the sugar yield from cane. As for material inputs, by the end of the century chemical fertilizer use should increase 160 percent in the South China Region, effectively irrigated area

should rise 30 percent, farm machine power should grow 50 percent, and rural electricity consumption should expand 50 percent. Although the above material inputs are sufficient to realize projected production goals, because cultivated land is generally scarce and cash crops bring good results, for a long time to come the South China Region will not be self-sufficient in grain. Even if it attains its increased production goals it will still need to bring in approximately 3.4 billion jin of grain from outside provinces before it can meet regional demand.

V. Discussion of a Few Problems

A. Is 800 jin of Grain Per Capita Sufficient?

In 1983 China reached an average per capita grain production of 755.7 jin. This figure is still 85.3 jin lower than the 1981 world average, and cannot be considered abundant. Because we currently use less than one-fifth of our grain for fodder, there is a big disparity between fodder consumption in China and in the developed countries of the world (fodder grain accounts for 70 percent of gross grain output in France, 57 percent in Yugoslavia, and 43 percent in Japan). We are also far from meeting the supply of fodder necessary to improve dietary compostion (in Beijing, Tianjin, and Shanghai average per capita grain consumption measures 851 to 952 jin; the grain ration accounts for 31.7 to 34.5 percent of grain consumption, and fodder grain comprises 32 to 36 percent). The problems some regions are now having selling their grain have primarily been brought about because food marketing policies; circulation channels; storage, transport, and processing capacities; and grain conversion expenditures have been unable to adapt to new circumstances. Consequently, this has produced a relative overabundance of coarse food grains and, in parts of some regions, it has produced a comparative general overabundance. This is a temporary superficial phenomenon. Generally speaking, in the past two years Chinese grain production has increased by a large margin and reversed the long grain shortage we have experienced. This is a major accomplishment, but it only meets the low-level consumption demand. After we resolve subsistence, the grain requirement that remains is not just a "grain ration" problem. In order to improve dietary composition we must rapidly increase the proportion of fodder grain in grain consumption and the proportion of "fine grain" (rice and wheat) consumption in the grain ration. If we adopted corresponding policies and measures to expand grain conversion (the use of grain for fodder and processed foods) and readjust varietal composition and distribution, we would promptly find that we do not have enough grain.

From the perspective of general world trends, as agricultural production develops and the standard of living improves there is inevitably a switch from merely producing unprocessed food grains for subsistence needs to expanding processing and multipurpose grain utilization. For example, in developed nations 10 to 30 percent of the average per capita grain holdings are used for grain rations, whereas 70 to 90 percent are used for fodder and other purposes. As far as our domestic situation is concerned, in 1983 average per capita grain holdings measured 800 jin or more in 9 provinces: Liaoning, Jilin, Heilongjiang, Sichuan, Hubei, Jiangsu, Zhejiang, Hunan, and Jiangxi. According to the relevant statistical data, in several northern provinces the

average per capita grain ration has generally reached 500 to 550 jin (here and below this refers to unprocessed food grain), and in several southern provinces it has generally reached 600 to 650 jin. These regions have in common a relatively high current level of ration-grain consumption, and we can say that they have already satisfied demand. However, consumption of animal products is still at a low level: in several northern provinces the average per capita consumption includes 26 jin of meat, 7.5 jin of fish, and 9 jin of eggs; in several southern provinces it includes 30 jin of meat, 5 jin of fish, and 5 jin of eggs. These figures convert to an equivalent of approximately 120 jin of fodder grain. This is still far from meeting our need to improve the standard of living and raise nutritional levels. Therefore, we must make a major effort to convert grain for fodder grain or other purposes, and only then can we promote further growth in grain production and meet the need to improve our standard of living.

As far as these provinces are concerned, we have a significant surplus after we satisfy our grain ration and other needs. For example, a typical survey of 44 rural households and 277 people in Liaoning, Jilin, and Heilongjiang shows that people generally have on hand 303 jin of grain per capita, and urban surplus grain and stockpiled grain coupons amount to 1.0 billion jin. A typical survey of 198 rural households and 1,066 people in Jiangsu, Sichuan, Zhejiang, and Jiangxi shows that surplus grain generally amounts to an average of about 150 jin per capita. This indicates that it is not only possible, but imperative, that we convert more grain in these provinces to fodder and other uses. From a national perspective, however, we have now only resolved basic subsistence problems. The quality of our diet is low and we consume a low level of animal products. Improving nutritional levels is still dependent on improving grain output. As for other agricultural products, the situation is similar: if we strive to develop multipurpose utilization, open up foreign trade markets, and expand conversion into various processed commodities, we will similarly find that production does not meet demand and there is no persisting problem of excess output. From the perspective of domestic and foreign development trends, by the end of this century the lower limit of average per capita grain holdings in China must be no less than 800 jin.

B. Has an Excess Appeared in Cotton Output?

In the past few years cotton production has grown rapidly. In 1983 gross cotton output totalled 92.74 million dan, and current average per capita cotton holdings measure 9 jin. Not only has every aspect of domestic demand been satisfied, but a large surplus has also arisen. We have already abolished the system we long followed of supplying cotton and cotton goods by voucher, and we have switched from cotton importing to cotton exporting. This is an extremely gratifying situation. However, as far as cotton spinning is concerned, in 1981 China procured 58.20 million dan of the 59.36 million dan of domestically produced cotton. Of this, 48.06 million dan was used in the textile industry, accounting for 82.2 percent of all cotton used for textiles (58.46 million dan). We also used 10.40 million dan of imported cotton, which thus made up 17.8 percent of all cotton for textile use. In 1982 cotton used in textiles totalled 70.00 million dan, of which 53.86 million dan, or 76.9 percent, was produced domestically, and 16.14 million dan, or 23.1 percent, was imported. The situation in the past 2 years indicates that we have to

import about 20 percent of all the cotton we use. Furthermore, as far as exported cotton textiles are concerned, in the past few years China has annually exported cotton textiles equivalent to 4.00 million pieces of cotton yarn [as published], requiring 18.00 million dan of cotton. This accounts for a very small proportion of world import and export trade in cotton textiles. The cotton China produces today is low quality, and varieties are unsatisfactory to meet requirements. This affects the demand for textile cotton and is an obstacle to Chinese textile exports. In the future we must pay close attention to improving cotton quality, cultivate varieties that correspond to textile requirements, and enhance cotton performance and suitability for spinning. The next step is to improve the quality of textile products in order to help open domestic and foreign markets. Forecasting development on this basis, by the end of the century, if cotton output stabilizes at about 100 million dan per year, we can satisfy demand.

C. The Issue of Improving Agricultural Product Quality

In the wake of growth in the national economy and the implementation of policies opening China to the outside world and envigorating the domestic economy, domestic and foreign market demands on agricultural product quality are constantly increasing. We need to improve quality and produce superior products suited to market needs.

1. Grain: We must constantly increase the proportion of fine grains. In 1949 average per capita rice and wheat holdings amounted to 230 jin, from 1952 to 1978 they rose from 301 jin to 396 jin, and by 1982 they had increased further to 452 jin. In the 30-plus years from from 1949 to 1982 rice and wheat holdings rose an average 5 jin per year--not a slow rate of increase. However, today there are still a number of places where people do not have enough fine grain to eat. In view of this situation, and considering the requirements of growth in the food industry, we still need to work to expand rice and wheat production. We need to achieve a level at which all the people essentially eat fine grain, and we must increase the proportions of polished round-grained and long-grained nonglutinous rice. Simultaneously, we must improve quality in all other grain crops and raise the content of nutritional substances like protein and lysine. According to studies, Chinese paddy varieties now generally contain 8 to 10 percent protein and wheat varieties generally contain 10 to 14 percent protein. If we use quality breeding and other methods to raise the protein content of these grains 1 to 2 percent, in one year we can raise net protein 3.5 to 7.0 billion jin. By using mutated high-lysine corn material to improve the lysine content of hybrid corn we can also supply several billion jin of high quality concentrated feed to the livestock industry. Chinese soybean varieties generally contain 40 percent protein. If we increase this to 45 percent we can supply even more plant protein and improve nutritional levels.

2. Edible Cash Crops: China has achieved progress in improving rape quality: we have now bred a variety with an erucic acid content of less than 1 percent, and we are conducting further seed selection to breed a variety that lacks both erucic acid and thioglucoside. Breeding and disseminating these varieties will improve and increase the food value of rapeseed oil. There is great potential for increasing the oil content of sunflowers, and sunflower

oil is superior in quality. We can expand sunflower cultivation. The sugar content of our sugarcane and sugar beets is lower than international standards, so there is also a great margin for improvement. We must also popularize cultivation of improved teas that have already been bred in local areas and improve source varieties for black and green teas. We need to improve the quality of flue-cured tobacco and reduce imports of high-quality tobacco. We should stress regional breeding systems for improved varieties of fruit trees to improve the competitive strengths of the fruit products we export.

3. Fiber Crops: For cotton, within the next time period we must focus on breeding suitable varieties that have a staple length of 27 to 29 mm and strength measuring 4 grams. We should also concentrate on strong elasticity and either fiber fineness measuring a 5,600 to 6,200 metric yarn count or fiber coarseness measuring 1.6 or more. Simultaneously, we must arrange to produce some different types of cotton with staple lengths of 31-plus mm or 25 mm. This will help us to make reasonable and coordinated use of textile cotton. As for hemp and jute crops, we must raise the proportion of high-quality jute and focus on improving ramie fiber quality. We also need to raise the silk yield from silkworm cocoons from the 1980 level of 10.5 percent to 15 percent. Furthermore, we should strictly enforce examination techniques on silkworm cocoons to guarantee their quality.

In addition to improving varieties through breeding and improving cultivation management techniques, we must strictly enforce variety and seed standards, deploy essential simple and accurate quality testing measures, and establish commodity production bases and foreign marketing bases for all sorts of crops. We must adopt a policy of quality-based pricing and get top prices for top quality. By constantly raising crop and product quality we will improve the competitive strengths of our commodities.

D. Suitably Expand Multiple Cropping and Guarantee a Certain Sown Area

China has a large population and little land, and cultivated land is the foundation of the planting industry. Without cultivated land there can be no planting industry to speak of. The crucial matter at present is that if we are to rigorously control occupation of cultivated land for other uses and make rational use of cultivated land, we must handle land management as well as we handle the population problem. However, hereafter, as the national economy grows, capital construction of urban and rural industrial and traffic facilities must occupy a great deal of cultivated land. According to statistics, in the balance between cultivated land occupied for other uses and cultivated land opened through reclamation, by the end of the century China will lose 100 to 200 million mu of cultivated land. Thus, we must make up for insufficient sown area by increasing the multiple crop index. We must strongly emphasize that, for multiple cropping and other production expansion measures alike, there is one condition: we must suit measures to local conditions. Otherwise, if we expand blindly we may doom ouselves to reduced output or we may increase production without increasing harvests. However, we cannot use this as a basis to deny the benefits of increasing production. According to statistics, half of the current cultivated land area, two-thirds of the sown land area, and two-thirds of the gross grain output arise from

multiple cropping, as well as over half of oil crop, cotton, and green manure production. From this the importance of multiple cropping in Chinese agricultural production is obvious. Most of China is situated in the temperate zone, but a considerable portion is located in the subtropical zone, where heat is ample and rainfall and heat arrive in the same season. As we improve production conditions and raise our technological level, and as we perfect and develop the output-related system of contracted household responsibility, we will open up even broader prospects for multiple cropping.

E. Revise Price Parities and Procurement Policies for Agricultural Products, Marshal Better Use of Economic Leverage To Promote Grain and Cash Crop Development.

Right now actual procurement prices for agricultural products (including the state assigned procurement base, increased prices for goods in excess of procurement quotas, material sales incentives, returned profits, and assorted non-price subsidies) are not based on value or production costs. This is totally irrational. Moreover, the pricing system is complicated and it is difficult to conduct a quantitative analysis of reasonable price parities between the various major farm and sidelines products. It is very difficult to resolve this problem. Right now there are large price differences within agricultural products, and this directly affects overall grain and cash crop development. According to a survey of Fushan Prefecture Guangdong, cultivating one mu of paddy producing 1,000 jin of rice per mu brings cash benefits of 110 yuan, and after deducting 40 yuan in costs the net income totals 70 yuan. Net income measures 216 yuan per mu when paddy land of equal fertility is used to grow peanuts, and it measures 190 yuan when used to grow sugarcane and 500 to 600 yuan when used to grow citrus. Surveys of Zhuzhou Hunan and Yexian Shandong show similar results: whether prices for agricultural products are equitable or not makes a big difference. Right now, the inequitable specific values of various agricultural products and the various factors obstructing circulation links have brought about overstocks of some goods and sellouts of other goods. This affects market supply, the standard of living, and peasant income, and it detracts from the development of commodity production. This problem has already progressed to the point that it absolutely must be resolved. First, procurement prices for all agricultural products must be based on production costs, or perhaps cash benefits from the various agricultural products should be roughly similar. Cash crops can be slightly higher than grain crops, but they should not be too much higher. Second, we can consider eliminating state price subsidies on state monopoly grain sales in the countryside. First we should abolish price subsidies on grain sold under incentive plans, and then we should eliminate grain-ration price subsidies. We can use the money saved by abolishing these price subsidies to raise the grain procurement price. Third, we should open everything further to public access and use purchase and sales contracts for agricultural products. All goods except those needed by the state should be left to the farmers to handle on their own.

VI. Major Conclusions

Based on a qualitative and quantitative study of 13 special topics and 28 crops, as well as on an agricultural regional location study using the

province as the unit, we have made systematic predictions and conducted comprehensive research into social demand, production quantities, and the measures necessary to realize our goals. Our major conclusions are as follows:

1. By the end of this century our dietary composition will still be centered around plant foods, and the average annual per capita demand will require 380 to 475 jin of grain, 45 to 60 jin of meat, 20 to 24 jin of eggs, 40 to 60 jin of milk, 11 to 18 jin of fish, 12 to 13 jin of vegetable oil, and 12 to 13 jin of sugar. As for garment composition, cotton will continue to be our major raw material, but the proportions of wool, silk, and synthetic materials in clothing will rise rapidly and apparel will tend to be top quality. The average per capita demand will require 4.8 jin of cotton, 4.1 jin of synthetic material, 1.2 jin of silkworm cocoons, and 2 jin of wool. At that time the standard of living will be obviously improved, but it will only be about equivalent to the average world standard at the beginning of the 1980's. We can only say that people will be comparatively well off; that is, they will have attained the consumption level currently enjoyed in medium and large Chinese cities. This is suited to the end-of-the-century average per capita purchasing power (consumption fund) of 804 yuan, as well as to the 480 yuan of consumer power that will be used to buy food and clothing. Based on these essential demand targets, and figuring that the population at the end of the century will be held to 1.2 billion, we can extrapolate that total social demand will require 1.00 to 1.05 trillion jin of grain, average per capita grain holdings will measure about 850 jin, and the ratio of ration grain to fodder grain and other grain uses will gradually be adjusted from 7:2:1 in 1980 to 5:3:2 at the end of the century. In addition, total social demand for cotton will total 100.00 to 108.00 million dan, average per capita raw cotton will measure about 8.5 jin, and the ratio of cotton used directly in daily life to cotton for other uses and cotton for export will gradually be adjusted from 6.8:3:0.2 (not including the portion imported to support exports) to 6:2:2.

2. By the end of the century unit yields and gross output of the major agricultural products will rise to a new level. Based on an item by item analysis of 8 major grain products, including rice, wheat, corn, soybeans, potatoes, and so forth, we conclude that it is possible to raise per-mu yield an average of 10 jin per mu, for a 2.4 percent rate of increase. Given that sown grain area is maintained at either 1.64 billion mu or 1.7 billion mu, at an average per-mu yield of 577 to 618 jin, gross output can reach 985.9 to 1,053.7 billion jin. If cotton growing area is held to 80.00 to 85.00 million mu, at an average per-mu yield of 120 jin, gross output will reach 96.00 to 102.00 million dan. If the area sown in oil crops is expanded to 160 to 80 million mu, at an average per-mu yield of 250 jin, gross output will total 400 to 440 million dan. If unit crop yields reach levels currently produced in Zhejiang and Jiangsu, gross production can essentially satisfy social demand and some superior products can be introduced to the international marketplace or expand existing exports.

3. Total social demand extrapolated by using the consumption function, production calculated by using system simulation and regression models, and

results of a location study conducted on China divided into six regions essentially coincide with the above overall forecast study.

4. A study of grain and cash crop development in the past few years indicates that after subsistence problems are essentially resolved a demand for improved food quality will inevitably emerge. This means that we must convert surplus grain to develop animal foods and other processed foods. Consequently, the rate of grain conversion will become a limiting factor in developing grain production. Simultaneously, the major limiting factor on cash crop development is no longer the issue of grain production, rather it hinges on market demand and people's purchasing power and consumption level. In the future these will be essential features of cash crop production development.

5. In the wake of increasing grain production, by the end of the century we will need to convert about 300.0 billion jin of grain into meat, eggs, milk, and fish. In order to create a stable fodder base the planting industry must gradually change from its traditional production composition of grain, cash crops, and other crops to one composed of grain, fodder crops, and cash crops. Growing areas for these three categories of crops should be adjusted from the current ratio of 8:1:1 to 6:2:2.

6. Because each region has different advantages for development, inter-regional imbalances in the quantities and varieties of agricultural products will persist. By the end of the century the Northeast and North China Regions may be able to transfer out 13.0 to 18.0 billion jin of grain, and the Northeast Region will also be able to ship out 5.0 billion jin of soybeans. The Middle and Lower Chang Jiang Region will be able to transfer out approximately 4.0 billion jin of grain. However, the South China and Northwest Regions will need to ship in 3.4 billion and 2.4 billion jin of grain, respectively. As for cotton, the Southwest, South China, and Northeast Regions will still have to transfer in 3.80 million, 4.80 million, and 4.40 million dan, respectively, at the end of the century. This will have to be shipped in primarily from the North China and Middle and Lower Chang Jiang Region. The Northwest Region may be able to transfer out 3.00 million dan or more, including approximatly 900,000 dan of long-staple cotton.

7. In order to achieve projected production targets, by the end of the century we will need to increase chemical fertilizer inputs to over 120 million tons and adjust the ratio of nitrogen, phosphate, and potash fertilizer to 1:0.6:0.2. Irrigated area must be expanded to about 870 million mu, agricultural machinery must reach 17 to 20 HP per 100 mu of cultivated land, and rural electricity consumption must total 30 kwh per mu of cultivated land. Agricultural pesticides must total 210,000 tons, and the ratio of insecticides, germicides, and herbicides must be adjusted to 6:2:2. Plastic sheeting for agriculture must total 700,000 tons. We must energetically disseminate scientific research achievements and advanced experiences and improve material and energy utilization ratios. In addition, we must strive to improve and popularize comprehensive and coordinated sets of techniques suited to different regions so as to make the best use of their benefits in increasing yields.

According to calculations, by the end of the century the total investment in agricultural, forestry, animal husbandry, sidelines, and fishery production will be approximately 1,010.0 billion yuan, and the investment in rural industry will total 411.7 billion yuan. Together, the total investment will measure 1,421.7 billion yuan. In conformity with our policy to rely primarily on accumulations raised by rural areas themselves to settle agricultural production funds, given the funding ratio of 1.2:0.6:1.5:6.7 for rural industrial support of agriculture, state funds in support of agriculture, farm credit, and peasant-raised funds, we can supply a combined total of 1,470.0 yuan and basically meet the demand for production funds.

8. We must adopt policies beneficial to agricultural development. Working from the basis of a stable and perfected output-related system of contracted household responsibility, we must raise labor productivity and economic results by a large margin through readjusting rural industrial composition, suitably expanding the scale of planting industry operations, and gradually concentrating those operations in the hands of farming experts. We must depend on and apply the law of value as our primary means of regulating production and demand. Likewise, we should implement effective macroeconomic management methods and gurantee that there is mutual coordination between production of major agricultural products and social demand, production capacity and consumption levels, production capacity and circulation capacity, and consumption levels and purchasing power. In the wake of the growth of commodity production, market demand has become the major factor conditioning output of various agricultural products. Consequently, when there is an increase in the output of agricultural goods we must correspondingly improve quality, increase the variety and assortment, expand markets, and adopt relevant measures to improve people's purchasing power and actual consumption capacity. Furthermore, we must guide and encourage consumption and form a satisfactory cycle between production and consumption. This is the only way that we can help to further develop production.

VII. Appendix

The research on grain and cash crop development problems was conducted under the direction of the CPC Central Committee Secretariat Rural Policy Research Center and the Chinese Rural Development Research Center. The purpose was to provide referance material for readjusting planting industry composition and for formulating a long-term agricultural plan and a rural development program. In October 1982 the Chinese Academy of Agricultural Sciences accepted the responsibility for directing this research. Cooperating units included 12 central government minstries and commissions, including the Ministry of Agriculture, Animal Husbandry, and Fishery (Planning Department, Land Management Bureau, Agriculture Bureau, Animal Husbandry Bureau, Aquatic Products Bureau, Government Research Office), the Ministry of Commerce (Comprehensive Grain Bureau, Commercial and Economic Research Institute), the Ministry of Forestry (Reforestation Management Department, Chinese Academy of Forestry Sciences), Ministry of Light Industry (Research Office, Food Industry Bureau, Tobacco Corporation), the Ministry of Textile Industry (General Office, Planning Department, Goods and Materials Bureau, Synthetics Bureau, China Silk Corporation), the Ministry of Foreign Economic Relations and Trade (International Trade Research Institute), the Ministry of Water Resources and

Electric Power (Government Research Office), the Ministry of Chemical Industry (Planning Bureau), the State Planning Commission (Economic Research Institute), the China Agricultural Bank, the Chinese Academy of Sciences (Agricultural Research Commission), and the Chinese Academy of Social Sciences (Agricultural Economics Institute); as well as 5 institutions of higher learning and certain scientific research organizations, including the Chinese Academy of Medical Sciences (Institute of Health), China People's University (Agricultural Economics Department), Beijing Agricultural University (Agronomy Department, Agricultural Economics Department, Animal Husbandry Department), Beijing Agricultural Mechanization Academy, Beijing Economics Academy (Population Research Institute), the Ministry of Light Industry Cane Sugar Industry Research Institute, the Tropical Plant Research Institute of South China, and the Heilongjiang Academy of Agricultural Sciences Cash Crop Research Institute. In addition, the Chinese Academy of Agricultural Sciences released specialists to form the Grain and Cash Crop Development Study Group. The staff participating in the research included comrades Lu Liangnu [4151 5328 1829], Liu Zhideng [0491 1807 3397], Niu Ruofeng [3662 5387 1496], Huang Peimin [7806 0160 3046], Mei Fanquan [2734 2455 2938], Li Yuanzhu [2621 6678 6999], Huang Bufan [7806 0008 0416], Yan Yubai [0917 3768 4101], Zhang Yuerong [1728 2588 5554], Zhang Di [1728 ?], Liang Zhenhua [2733 2182 5478], Qin Yongnan [4440 3057 2809], Luo Haiping [5012 3189 1627], Xiao Jingyue [5135 4552 6460], Zou Fanwen [6760 5400 2429, Cheng Yannian [4453 1693 1628], Wang Guangzhi [3769 1639 2535], Meng Chi [1322 7459], and Zhu Zhongyu [2612 1813 3768]. In addition, 20 research institutes directly subordinate to this academy participated in the study.

After the symposium, in accordance with a resolution by the conference leading group, the Chinese Academy of Sciences Grain and Cash Crop Development Study Group, after adding a few revisions to the text of the discussion, advanced a "Comprehensive Report on Grain and Cash Crop Development in China" (Revised Text of the First Symposium), which it sent in October 1983 to all concerned units to solicit opinions.

In the spirit of the proposal made at the first symposium that this study "become more intense and expand its scope, first intensifying and then expanding," from September to October 1983 the Chinese Academy of Sciences Grain and Cash Crop Development Study Group conducted surveys in the Northeast Region, the Northwest Region, the Southwest Region, and the Middle and Lower Chang Jiang Region, respectively. From March to May 1984 the group held a special symposium on three topics: "Fodder Sources and Animal Foods," "Ligneous Foods and Oils," and "The State of Food Consumption in Provinces and Cities That Have an Average 800 Jin of Grain Per Capita." In addition they conducted specialized research on the state of produce and livestock consumption in 48 medium and large cities and on economic measures that must be taken to achieve projected production. Simultaneously, building from grain and cash crop research in every province, municipality, and autonomous region, and from elementary agricultural statistics on all Chinese provinces and counties, they conducted a grain and cash crop development location study of China after dividing it into six natural agricultural regions based on provincial units. Based on the various jobs discussed above, the group wrote its "Comprehensive Report on Grain and Cash Crop Development in China."

12510
CSO: 4007/59

BRIEFS

NEW ANIMAL BY-PRODUCT CENTERS--Beijing, 16 November (XINHUA)--China plans to add hundreds of animal by-products centers in the Seventh 5-Year Plan period (1986-1990) as a part of its efforts to improve the living standard of its huge population and to increase animal product export, according to a national agricultural meeting in session here. In 1990, there will be 150 lean-pork production centers, 10 water fowl centers and 200 sheep centers in addition to those for beef cattle, goats, rabbits, ducks and honey. Each of the 1 billion Chinese will have an average of 20.5 kilograms of meat, 7.8 kilograms of eggs and 5.6 kilograms of fresh milk by 1990, compared with 18.5 kilograms of meat, 5.1 kilograms of eggs, and 2.8 kilograms of fresh milk last year. Daily intake of energy from animal and poultry products will rise from 205 kilocalories to 321 kilocalories per person. Now, the country has 75 pig centers, 80 chicken farms and 115 million draft animals. This year's meat output is expected to reach 20 million tons, 5.2 percent more than in 1985. [Text] [Beijing XINHUA in English 0233 GMT 16 Nov 86 OW] /12232

FARMERS CULTIVATING MORE ACREAGE--Beijing, 18 November (XINHUA)--The Chinese Government is encouraging redistributing farmland to more capable farmers. "In the suburbs of large cities, regions where the economy is developed or areas which are overpopulated, farmers now cultivate more land compared with previous years," according to a speokeman for a national conference on agriculture. "Previously, each household only planted about 1 hectare," he told XINHUA, "but not, able families may cultivate several or a dozen hectares even in densely populated regions." Encouraged by the government, farmers are free to decide the form and scale their production will take, and they can also work cooperatively with other farmers, he said. "China began implementing a rural household responsibility system in 1979 and along with the development of rural enterprises and diversified businesses, more and more farmers have been shifting to other professions rather than working in the field," he said. As a result, farmers who have more funds and manpower are willing to contact more land, and agricultural experts believe this redistribution of land will help farmers bring in better economic results. [Text] [Beijing XINHUA in English 1117 GMT 18 Nov 86 OW] /12232

COMPUTERS MONITOR RURAL MARKETS--Beijing, 21 November (XINHUA)--China has begun using a computer system to monitor agricultural produce prices in domestic rural markets. The new system, the first of its kind used in China, has been put into operation after passing technical evaluation, and will help provide comprehensive

rural marketing information to policy makers, producers and consumers. The group of scientists responsible for the system's evaluation believe it to have effective practical functions and to be helpful in policy making. The system involves three sub-systems, price monitoring, information processing, and comprehensive analysis. The monitoring system is able to watch prices of agricultural produce in 170 cities and towns throughout the country. The processing system will analyze monthly and quarterly marketing information, while the comprehensive analysis system will make annual or semi-annual analyses of rural markets in 28 provinces, municipalities and autonomous regions. [Text] [Beijing XINHUA in English 0256 GMT 21 Nov 86 OW] /12232

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CSO: 4020/47

BRIEFS

HONEY EXPORTS--In the first half of the year, Anhui exported 3,000 tons of honey to the U.S., Japan, and Europe, and earned $2 million U.S. in foreign exchange. [Excerpt] [Hefei ANHUI RIBAO in Chinese 20 Oct 86 p 2]

CSO: 4007/67

RENMIN RIBAO ON SOUTHERN FARMERS' SUCCESS

OW120518 Beijing XINHUA in English 0146 GMT 12 Nov 86

[Text] Beijing, 12 November (XINHUA)--Although some Chinese farmers now turn to rural enterprises for income, others in southern China are going back to the fields to seek prosperity, the PEOPLE'S DAILY reports.

An increasing number of farmers in Dongwan City, an economically-developed region in south China's Guangdong Province, are returning to producing vegetables and fruits which are currently in short-supply.

Since China began rural economic reform in 1979, a great number of rural factories and enterprises have been set up, which employ many able-bodies farmers.

According to the report, "Rural areas cannot become propserous without rural enterprises" is a popular slogan in the countryside, but, as a result, many farmers have squeezed into factories and some farmland is going to waste.

The south China farmers' success has drawn the interest and attention of Chinese economic experts, who in a PEOPLE'S DAILY commentary said, "Farming is an integral part of the rural economic structure, and in addition to rural industries, farming, commerce, fish breeding and fruit growing can also lead to prosperity."

In 1985, Dongwan City's total agricultural output value was 2.4 times the 1980 figure. The City's suburban areas have opened 6,000 hectares of farmland, built 16,000 family farms and grazing areas in cooperation with other regions and provinces. The average annual per capita income was 2,000 yuan (540 U.S. dollars) last year, while annual household incomes amounted to 10,000 yuan (2,700 U.S. dollars).

The paper added, "with the development of scientific technology and especially bio-engineering, rural productivity and economic results will see big breakthroughs."

The paper praised the party's policy of treating agriculture as a foundation of the society and its introduction of flexible government policies to suit the needs of agricultural development.

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CSO: 4020/47

BRIEFS

INCREASED LIVESTOCK--Beijing, 20 October (XINHUA)--Total livestock in southwest China's Guizhou Province reached 5.5 million head by 30 June, 4.73 percent more than at the same time in 1985. During the Sixth 5-Year plan period (1981-1985), Guizhou's livestock population increased an average of 5 percent a year. [Text] [Beijing XINHUA in English 0638 GMT 20 Oct 86 OW] /12232

CSO: 4020/47

BRIEFS

HUNAN ANIMAL HUSBANDRY DEVELOPS--Animal husbandry in Hunan Province has developed continuously this year. The amount of live pigs sold by the end of September was 18 million head, and the per capita pgis sold ranked first in the whole country. According to preliminary statistics, gross output of pork, beef, and mutton this year may reach 1.5 million tons and the output value 3.7 billion yuan, an increase of 260 million yuan over last year. The province has built 6,000 mixed feed plants whose annual capacity is 1.3 million tons. Fifty-nine counties have set up veterinary and animal husbandry technological service centers or joint county veterinary stations. With the joint county veterinary stations as the backbone elements, the province has trained 18,000 specialized households of various kinds serving animal husbandry. The whole province has formed an effective service network. The province has built 28 lean meat pig base counties, which sold 260,000 head of lean meat pigs in 9 months, some 300 percent more than in the same period last year. By the end of September, our province had sold some 1.7 million head of live pigs to Guangdong Province, 250,000 more than in the corresponding period last year. It is estimated that by the end of this year, the number of live pigs sold to Guangdong may reach 6 million by the end of September this year. [Summary] [Changsha Hunan Provincial Service in Mandarin 1100 GMT 8 Nov 86 HK] /12232

CSO: 4007/68

BRIEFS

RICE EXPORTS--Jiangsu Province has exported 10,000 tons of rice to Poland. [Summary] [Nanjing XINHUA RIBAO in Chinese 25 Oct 86 p 1]

CSO: 4007/67

PREVENTION, TREATMENT COUNTERMEASURES FOR SOIL EROSION

Xi'an SHUITU BAOCHI TONGBAO [BULLETIN OF SOIL AND WATER CONSERVANCY] in Chinese No 3, Jun 86 pp 16-21

[Article by Chen Jiazheng [7115 1367 2973], Jiangxi Agricultural University]

[Abstract] Jiangxi is composed predominantly of hills and mountains, with only 12,500 and 4,200 square kilometers of plain-terrace land and water surface--7.6 and 2.5 percent--respectively, of the total area of 166,600 square kilometers. The main cause of erosion is the heavy rains in May and June; this is approximately 40 percent of the intense annual precipitation of 1,400 to 2,000 millimeters. Soil and water erosion are the major culprits. The total soil-erosion area of the province was 3,625,000 hectares (in 1985)--21.7 percent of the total area. Erosion is spreading at an accelerating rate: from 1,067,000 and 1,800,000 hectares in the early Liberation period (early 1950s) and 1964, respectively. Loss of fertile soil, exhaustion of arable soil, silting up of riverbeds, diminished reservoir capacity, deteriorating environment, more frequent flooding and its related calamities (such as landslides), and shortages of timber and firewood are the products of erosion. The human factors of excessive timber cutting and reclamation of timberland for use as farms are mainly to blame. The author proposes comprehensive planning of mountains, water surface, farms, forests and roads with cognizance of the economic, social and ecological effects. He cites an individual peasant who invested only 230 yuan in 1984 to build a 6 cubic meter manure pool to generate methane, annually saving more than 3 tons of firewood and 20 yuan in the cost of electricity for lighting. After generating methane, the refuse was used to breed 100,000 earthworms, which were fed to 50 chickens and more than 10,000 fishes. The remaining liquid refuse was used as farm fertilizer as hog manure was dumped into the methane pool. Thus, the annual family income came to 12,000 yuan, an astounding amount among Chinese peasants. However, what is left unsaid by the author is the kind of market-oriented political policy that makes such rural prosperity feasible.

10424/9716
CSO: 4011/03

POOR GROWTH OF WHEAT, RAPESEED CROPS

HK140255 Xian Shaanxi Provincial Service in Mandarin 0030 GMT 14 Nov 86

[Excerpts] The growth of the proivnce's wheat and rapeseed crops is rather poor this year. It is essential to get a good grasp of winter field management.

Early this month, the provincial Agriculture and Animal Husbandry Department sent experts and technicians to more than 10 counties in Weinan and Baoji to investigate the growth of wheat and rapeseed on both irrigated and dry land. After making on-the-spot sample surveys, the experts held that the current main problems in the growth of these crops are: The sprouts are small and weak; flowering is slow; there are not many leaves; and the stalks are not sturdy. Many of the plants are third grade.

The main reasons for this are: The long period of drought and a serious lack of soil moisture in the wheat fields; lack of sufficient chemical fertilizer; and a reduction in the amount of base manure applied.

In view of the problems and the experts' proposals, the provincial authorities have called on all areas to get a good grasp of the following measures in winter field management: irrigation and manuring must be done at an early stage in the irrigated areas. In dry areas, the fields must be rolled so as to preserve soil moisture. Manuring should follow the rolling. Action must be taken to fight drought. For the rapeseed, the main things to be done are irrigation and manuring. For both crops, it is essential to do a good job in surveying and dealing with plant diseases and insect pests.

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CSO: 4007/68

STATUS, PROBLEMS OF IRRIGATION WATER FROM YELLOW RIVER

Zhengzhou RENMIN HUANGHE [THE PEOPLE'S YELLOW RIVER] in Chinese No 2, 26 Apr 86 pp 42-44, 61

[Article by Chi Wenjiang [6688 2429 3068], Department of Agriculture and Water, Ministry of Water Conservation and Electric Power]

[Abstract] This is a report on 16 irrigation regions using water from the Yellow River; other than the author, the investigation was jointly conducted by Zou Guangrong [6760 1684 2837] of the author's department, Tong Erxun [0157 0059 8113] of the Yellow River Commission, and Wang Chunyi [3769 2504 5030], Jin Diantang [6855 3013 1016] and Bian Yushan [0593 3768 1472] of the Shandong Provincial Department of Water Conservation. The investigation covered six prefectures and municipalities: Dongying, Huimin, Dezhou, Liaocheng, Heze and Jining. First, the author presents an inventory of the irrigation facilities (using Yellow River water) built in Shandong Province since 1966, the year the project began: 40 culverts and lock gates, 75 syphons at 26 sites, a designed irrigation flow of 1,645 m^3/sec, 68 irrigation regions, and a designed irrigation area of 18,660,000 mu. The irrigation scheme benefits agriculture, as shown in the average yields of 883 jin of cereal grain and 141 jin of cotton per mu in five prefectures and municipalities along the Yellow River. To a certain extent, groundwater has been desalinized. The areas of saline soil were reduced to 4,750,000 mu from 9,660,000 in 1965, the year just before the irrigation project began. Silt covered barren land, transforming it into fertile farm. Following silt settlement, more than a billion cubic meters of water per year are supplied to inland waters, industries, inhabitants and the Shengli Oil Field. In northern Shandong, drainage of flood water was increased from 1140 m^3/sec in 1965 to 3,912 m^3/sec now, thus helping desalination and lowering the groundwater level for further expansion of the irrigation project.

However, the irrigation capacity considerably exceeds the river's supply during the low-water period; this problem can be relieved to some extent by properly utilizing the irrigation income in the form of water usage fees. As practiced in one irrigation region, water usage tickets and prepayment of water usage fees are employed to economize on water and thus serve a larger irrigation area. The fee income should be used in maintenance and depreciation of facilities, silt removal, administration, and major repairs. Silting of drainage channels remains a major problem, causing floods.

10424/9716
CSO: 4011/05

GU JINCHI ON PRICES OF ARTICLES FOR DAILY USE

HK241053 Chengdu Sichuan Provincial Service in Mandarin 2300 GMT 22 Nov 86

[Text] According to a report in SICHUAN RIBAO, a phenomenon that the masses have vied with one another in rushing to purchase commodities, including white sugar, salt, vegetable oil, and grain, has appeared in places, including Chengdu, Nanchong, and Zigong, since the middle of this month. There has been a rumor that the prices of these commodities will rise very quickly. Everybody is talking about this.

In view of this, yesterday [22 November], a reporter went to interview Vice Governor Gu Jinchi and asked him to talk about the relevant problems.

Vice Governor Su Jinchi said: The rumor that the prices of white sugar, salt, vegetable oil, and grain will rise is groundless. I can definitely tell all people throughout our province that the country has made proper arrangements for the supply of these four kinds of commodities.

Question: Why have these several kinds of commodities been out of stock in some places?

Answer: So far as I know, this is simply the result of the normal supply and marketing channel being strained by the phenomenon of many people vying with one another in rushing to purchase them. We have an ample supply of these several kinds of commodities and can fully guarantee their supply. However, the demand has increased by several times and the transportation and processing links cannot cope with the situation for the time being. The departments concerned in places, including Chengdu, are now rushing to transport them to meet the needs of the market.

Question: Why has this practice of vying with one another in rushing to purchase them occurred among the masses? What is your view?

Answer: According to investigation and analysis, the worries of some people about the rise in commodity prices are reflected in a concentrated way in their consumption behavior. Some people are very sensitive to a rise in commodity prices and can hardly bear it in their mind. So long as there is a rumor in society that the prices of certain commodities will rise, people will be induced

to vie with one another in rushing to purchase these commodities. This also shows that it is very necessary to strengthen publicity of and education in the consciousness of the commodity economy among the masses.

Question: Will the commodity prices greatly change now?

Answer: No, they will not. The general principle of our province's policy of the commodity prices is to maintain basic stability. This is also an objective requirement for the continuous development of the socialist economy.

Question: What consequences will be caused by people's blindly rushing to purchase commodities?

Vice Governor Gu Jinchi said: People's blindly rushing to purchase commodities does no good to our country or to individuals. In particular, it will cause people to feel uneasy, affect the stability and unity of society, and give an opportunity to a small number of lawless people so that consumers incur direct economic losses.

Question: What attitude will the provincial government adopt toward the practice of people vying with one another in rushing to purchase commodities?

Vice Governor Gu Jinchi said: The provincial government has shown great concern for this and decided that it would continuously do well in grasping two aspects of work this winter and next spring.

1. It will maintain the basic stability of the market commodity prices, particularly the stability of the prices of main commodities, including grain, oil, meat, and vegetables, and guarantee the market supply during the Spring Festival.

2. It would carry out a large-scale inspection of the commodity prices with the emphasis laid on the prices of consumer goods, means of production, and noncommodity charges. It would severely deal with the unlawful actions of taking the opportunity to indiscriminately raise prices and really guarantee the interests of the consumers.

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CHARACTERISTICS, RATIONAL UTILIZATION OF LAND RESOURCES

Dalian ZIRAN ZIYUAN [NATURAL RESOURCES] in Chinese No 2, Jun 86 pp 9-15, 36

[Article by He Shaoji [0149 4801 4614], Hangzhou University]

[Abstract] Zhejiang Province is a typical subtropical monsoon region with plains and waters occupying 22.68 and 1.36 percent of its area of 102,000 square kilometers. The remainder is composed of hills and mountains. Annual precipitation ranges from 1100 to 1900 millimeters, higher in the southwest inalnd and lower along the northeast seacoast. During the typhoon season, most damage is confined to the northeast coast while rains relieve drought conditions further inland. The major agricultural soils are humus soil and paddy soil, mostly along the banks of Hangzhou Bay and the southeast coast. Since the average cultivated land per capita is only 0.72 mu, the province is compelled to take advantage of its landforms of predominantly hills and mountains for the balanced utilization of forests, animal husbandry and cash crops instead of the conventional cereal grains in agriculture. Like elsewhere in China, excessive timber cutting is also a serious problem in the province; it is necessary to mark off some mountains for reforestation in order to create forest preserves. The state should draft a policy of supplying hill and mountain peasants with cereal grains so that they can cultivate tea, bamboo, fruit trees, and firewood and timber forests for balanced economic growth. Seven tables list varieties of landforms, average land per capita, composition of agricultural income, forest area and timber reserves, distribution of cultivated land, as well as hill and mountain areas.

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BRIEFS

POLLEN PRODUCTS EXPORT CENTER--Hangzhou, 24 November (XINHUA)--China will build its largest export center of nutrient pollen products in this capital of Zhejiang Province, a local official said today. The State Science and Technology Commission will invest 1.5 million yuan (400,000 U.S. dollars) in the construction. A research institute on the application of locally abundant sesame and rapeseed pollens has already been established. The first product--an orally administered liquid has been developed jointly by a local company and a research institute of the Zhejiang medical society. With a complete range of nutrient elements, the product is said to be able to enhance strength, improve the functions of the heart and memory, and increase protein in the blood serum. [Text] [Beijing XINHUA in English 0703 GMT 24 Nov 86 OW] /12232

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